CHAPTER 6

Summary and concluding remarks
The general aim of this thesis was to investigate the role of species characteristics in national public decisions regarding species and their conservation. The central question of the research conducted for this thesis was to what extent perceivable species characteristics and related assigned values of species (i.e., the relative importance or worth of a species to an individual or group in a given context; Brown 1984) are likely to affect conservation-related public decisions regarding specific wild animal species. From this central research question, four specific research questions were derived:

- The first specific research question asked whether taxon-based and size-based (i.e., related to a species' relative size within a taxon) patterns are present in conservation-related public decisions regarding specific animal species and if so what the nature of such patterns is.
- The second specific research question asked to what extent possible taxon-based and size-based patterns have changed over time.
- The third specific research question asked what the demands and support of different actors or interests in public species conservation are, primarily as a function of species' taxon and species' size, and secondarily of species' population characteristics.
- The fourth specific research question asked what new methodological approaches can be developed to overcome limitations of previous research.

In short, the results of the studies conducted for this thesis show a strong role for characteristics as embodied in animal taxa, in all three cases investigated:

- national species law in the Netherlands that was enacted in the period 1857–1995 (Chapter 2)
- recent Environmental Impact Assessments (EIAs) in the Netherlands (Chapter 4), and
- the willingness of major nongovernmental organizations (NGOs) in the Netherlands to support national public decisions on the conservation of habitats of specific species (Chapter 5).

In addition, the studies on Dutch species law and Dutch NGOs also showed that the relative size (within a taxon) of animal species also played such a role (Chapter 3 and 5).

The findings are further discussed below as follows. In Section 6.1, the main findings of this thesis will be discussed more specifically, in terms of the specific research questions formulated above. In Section 6.2, the main findings will be discussed in a broader perspective, in terms of the central research question and considering the possible role of factors not investigated in the empirical chapters. Section 6.3 will provide general conclusions and Section 6.4 will discuss possible implications. Finally, Section 6.5 will provide recommendations for further research and for biodiversity policy.
6.1. The findings with respect to the specific research questions

Taxon-related and size-related patterns in public decisions on specific animal species

As discussed in Chapter 1, prior research has shown that a variety of species characteristics may affect individual responses to wild animal species. However, systematically investigating the possible role of such characteristics (and the related assigned values of species) in public decisions regarding species has received relatively little attention. In short, a variety of characteristics that may be important in individual-level responses to species are embodied in species’ taxonomic groups. Moreover, studies on species law have suggested a role for taxa in public decisions. Therefore, taxon was chosen as a major variable in this thesis for investigating the role of species characteristics. Prior research also suggests a role for species size. Surprisingly, this role has very rarely been investigated, either at the level of individual responses or at the level of public decisions. Therefore, in this thesis, species size was chosen as a second major species variable. The first specific research question asked whether taxon-based and size-based (i.e., related to a species’ relative size within a taxon) patterns are present in conservation-related public decisions regarding specific animal species and if so what the nature of such patterns is.

Taxon-related patterns
Taxa such as birds or insects represent classified sets of species characteristics. For example, all insects possess three pairs of legs and usually two pairs of wings, and their heads typically bear a single pair of antennae and a pair of compound eyes (Barnes 1980, p. 829). Such sets of characteristics may differ considerably between taxa, particularly on the level of bauplans (Brusca & Brusca 2003, p. 42), and they are often easily perceivable. As was argued in Chapter 1, it was expected that species of different taxa would be subject to public protection to different extents, or have different chances of being protected. To address the first specific research question of this thesis, an assessment of the presence and nature of such taxon-related patterns in public decisions regarding specific species was undertaken.

In Chapter 2 it was found that the relative representation of different taxa under Dutch species law in the period 1857–1995 varied in relation to the legal objectives that were distinguished (i.e., ‘protection’, ‘use’ and ‘control’). That is, species of different taxa clearly differed in the relative levels at which they had been incorporated into the different legal objectives, both when considering their percent contributions to the numbers of species within legislation and when considering the approximate extent to which the species of taxa occurring in the Netherlands had been subject to these objectives over the 1900–1995
Table 6.1 The main results of the studies in this thesis concerning the role of taxonomic groups (taxa) in conservation-related public decisions regarding specific animal species and relative taxon ranks based on the results

<table>
<thead>
<tr>
<th>Taxonomic group</th>
<th>Chapter 2 (Species legislation aiming at ‘protection’ 1857–1995)</th>
<th>Chapter 4 (Species data in EIAs)</th>
<th>Chapter 5 (‘Attitudes’ of NGOs toward species conservation policy)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(I) First appearance in legislation (1857–1995)</td>
<td>(II) Relative contribution to the number of species under legislation (1857–1995)</td>
<td>(IV) Frequencies with which EISs refer to species groups (n = 72 EISs)</td>
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<tr>
<td></td>
<td>(III) LSCI values (1900-1995)</td>
<td></td>
<td>(V) Frequencies with which EISs refer to specific species (n = 51 EISs)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(VI) Judged importance for NGOs of species’ continued existence</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(VII) Judged agreement of NGOs with conservation measures for species</td>
</tr>
<tr>
<td></td>
<td>Year</td>
<td>Rank</td>
<td>(%) cumul.</td>
</tr>
<tr>
<td>Birds</td>
<td>1857</td>
<td>1</td>
<td>12387</td>
</tr>
<tr>
<td>Mammals</td>
<td>1880</td>
<td>2</td>
<td>1126</td>
</tr>
<tr>
<td>Amphibians &amp; reptiles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amphibians</td>
<td>1914</td>
<td>3</td>
<td>255</td>
</tr>
<tr>
<td>Reptiles</td>
<td>1973</td>
<td>4</td>
<td>67</td>
</tr>
<tr>
<td>Fish</td>
<td>1973</td>
<td>4</td>
<td>52</td>
</tr>
<tr>
<td>Insects</td>
<td>1973</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Other invertebrates</td>
<td>1973</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

1 In this column, the percentages shown in Fig. 2a (Chapter2) have been cumulatively summed by year over the entire 1857–1995 period.
2 The frequencies as were shown in Fig. 1 in Knegtering et al. (2000) have been cumulatively summed by year over the entire 1857–1995 period.
period. Regarding the objective of ‘protection’, which is the most relevant objective in the present context, two results should be emphasized. Firstly, taxa differed considerably in their first years of appearance in species legislation aimed at ‘protection’ (see also Table 6.1). Secondly, taxa also differed in their percent contribution to the numbers of species under this legislation (see also Table 6.1).

In Chapter 4, it was found that the frequency with which indigenous wild animal species in the Netherlands were incorporated into recent Dutch Environmental Impact Statements (EISs) varied significantly with taxa (see also Table 6.1). In addition, compared to the other vertebrate taxa combined, the data used on birds was of a higher quality. Compared to other taxa, more recent, more detailed or more comprehensive data on birds had been particularly more frequently used in EISs, rather than data of lower quality.

Chapter 5 reported the results of an experimental study in which representatives of Dutch nongovernmental organizations (NGOs) rated the importance to their NGOs of the continued existence of 16 wild animal species in the Netherlands and their NGO’s support for hypothetical public conservation measures for these species. The analysis revealed that, in both cases, taxon had a significant effect on the judgements (see also Table 6.1).

Based on the different results in Chapters 2, 4 and 5, Table 6.1 provides the relative ranks for the taxa distinguished. This enables a rough overall comparison of the different results regarding taxa. In all seven cases presented, both birds and mammals were considered, and in all cases birds rank first and, with one exception, mammals rank second on the different measures (Table 6.1). In addition, for the results of the studies that in principle covered all taxa (5 cases), amphibians or amphibians and reptiles combined rank third on the different measures, with the exception of one case (Table 6.1, Columns I–V). Furthermore, in all of these five cases, fish rank fourth, with the exception of one case (Table 6.1, Columns I–V). For the invertebrate groups that were considered, the ranking appears to be more variable. On average, insects rank lower than fish and/or the other vertebrate taxa. In turn, molluscs (including gastropods) generally tend to rank lower than insects. This is the case for the results of the experimental study and in relation to the percent contributions to the numbers of species within legislation, however, not for the values that indicate the approximate extent to which the species of taxa occurring in the Netherlands had been subject to legal objectives over the 1900–1995 period (i.e., LSCI values) (Table 6.1). Crustaceans were only considered separately in the study on species law and are ranked equal or almost equal to molluscs (Table 6.1, Columns I–III).

Thus, the studies conducted revealed obvious differences between taxa in a variety of contexts relating to the public conservation of wild animal species in the Netherlands. Moreover, at least for the vertebrate groups considered, and particularly for birds, the patterns of these differences between taxa appeared to show considerable similarities. Within ‘lower’ taxa, the differences are less distinct or consistent.
The findings of this thesis show that, in general, Dutch society tends to respond differently to wild animal species of different taxa, and this is also apparent with respect to conserving species. The findings are in accordance with several other studies showing that societal or individual responses to species tend to vary with taxa (see also Section 1.2). Examples of the former include studies on species law in many countries (De Klemm & Shine 1993), in the US (Bean 1977; Bean & Rowland 1997), on the US Endangered Species Act (ESA) (Wilcove et al. 1993; Simon et al. 1995; Metrick & Weitzman 1996, 1998; Dawson & Shogren 2001), on species subject to Sites of Special Scientific Interest in Britain (e.g., Blackstock et al. 1996) and on species included in EIAs (e.g., Treweek et al. 1993; Read 1994; Thompson et al. 1997; Byron et al. 2000; Treweek 2002).

A notable finding of this thesis is the consistency with which birds appeared to be the most ‘preferred’ taxon in the different conservational contexts investigated in the Netherlands. Highest ranks for birds have also been found in other studies, for example, on individuals’ judgements of animals (e.g., Kellert 1980, 1985b; Schulz 1987; Czech et al. 1998), on species subject to the ESA (Metrick & Weitzman 1996, 1998; Dawson & Shogren 2001) and on the number of NGOs concerned with only a limited number of taxa (Czech et al. 1998). The relatively strong appreciation of birds and the variety of assigned values that birds may have are likely to result from several factors that act independently or combined. Use of their meat, eggs and feathers reveals straightforward use values of birds. In addition, many birds are diurnal and conspicuous due to their flight, mobility, songs, calls and colours, and they often inhabit urban areas, all of which makes them readily noticeable (Schulz 1987; Kellert 1996, p. 80; Lemaire 2007, p. 33). Conceivably, the relatively frequent exposure of birds to people may also enhance their attractiveness, in other words, they may be attractive due to mere exposure (Zajonc 1968, 2001). Birds may also have aesthetic values due to a ‘graceful’ bauplan, locomotion and colours, as shown by their use as cage birds and as subjects of paintings, photographs or bird-watching. Bird songs or calls may also represent aesthetic values and are referred to in poetry, songs and instrumental music (Lemaire 2007, p. 38). Bird songs may also evoke associations with spring and related feelings of happiness and melancholy, or experiences close to those associated with religion or transcendence (Lemaire 2007, p. 33–43). Furthermore, most birds are not dangerous to people (Schulz 1987). Anthropomorphism is probably also often involved, given the appreciation of, for example, the faces of owls, the dancing of cranes, or of birds capable of imitating the human voice (e.g., parrots) (Lemaire 2007, p. 26, 45). Likewise, birds belong to one of very few groups of animals that share bipedism with humans (Alexander 2004). The symbolic values of birds have become apparent by their use in physiognomy (i.e., judging human character on the basis of external features), fables, cartoons, comic strips, religion, language and sport (Lemaire 2007, p. 49–77).
Consequently, as argued above, at least regarding the factor of the phylogenetic relatedness of species to humans, the findings of this thesis do not support the ‘similarity principle’, which suggests that in general greater consideration is given to species perceived to be similar or closely related to humans (Plous 1993; DeKay & McClelland 1996). As humans are phylogenetically more closely related to mammals than to other taxa (see also Fig. 1.2), this principle would imply that mammals should have ranked the highest. This was not found to be the case as, on average, birds consistently rated higher than mammals. At least for the contexts investigated, the finding supports the methodological decision to investigate responses to species as a function of the nominal variable taxon rather than of the ordinal or ratio variable phylogenetic relatedness to humans.

Another notable finding of this thesis is the apparent differences between taxa in the extent to which their species were subject to the different legal objectives distinguished – that is, ‘control’, ‘use’ and ‘protection’, as well as the changes in this extent over time. Apparently, society may assign considerably different values to species of one and the same taxon. This may, in some cases, evoke competing pressures on public decision-making regarding the legal status of the species. This issue is further discussed in Section 6.2.

The results of this thesis strongly suggest that species characteristics embodied in a taxon affect public decisions regarding wild animal species. It is probable that perceivable taxon-specific physical, body characteristics such as morphology, size and locomotion play an important role here as do behavioural aspects. Size, for example, is partly taxon-related, with mammals usually including much larger species than other taxa. This feature might also affect conservation tendencies as is suggested by the so-called significant first-order interaction Taxon × Relative Size that was obtained in the experimental study reported in Chapter 5. In this case, the effect of a species’ relative size on the judged importance of its continued existence was larger for mammals than for other taxa. This issue of size in particular is further discussed below. More generally, the issue of species characteristics potentially having effects on public decisions regarding species is further discussed in Section 6.2.

Furthermore, appropriate caution is needed when generalizing on the basis of taxon-related patterns as were found, for example, in the present study. Taxonomic groups are a rough measure for species groups sharing certain physical properties. Characteristics of species within one and the same taxon, however, may sometimes still vary considerably, including those which are potentially important for societal responses to species, such as size. Mammals, for example, include such morphologically different species groups as mice and whales. Furthermore, ranges of certain characteristics of species within a taxon may vary with geographical region (see e.g., Gaston et al. 2008). This includes variation in body size, which ranges within taxa depending on latitude, as has been shown for birds (e.g., Cardillo 2002) and butterflies (e.g., Hawkins & Lawton 1995). Consequently, insofar as human judgements of species are influenced by their relative size within taxa, average judgements of species within a taxon might show variation, depending on the geographical region, at least to some extent.
**Size-related patterns**

Body sizes of different wild animal species may vary considerably. This variation may be both dependent and independent of taxon. As argued in Chapter 1, it was expected that size-related patterns in public decisions regarding specific animal species would be apparent. That is, it was expected that it would become apparent that species of different sizes had been subject to some form of public protection to different extents or had or have different chances of becoming so. Thus far, this issue has been little investigated. Therefore, the first specific research question of this thesis also included an assessment of the presence and nature of such size-related patterns. The focus was on species’ relative size within the taxa distinguished.

In Chapter 3 it was found that for most species subject to Dutch species legislation in the 1857–1995 period, for most taxa, average body sizes of species differed for the different legal objectives distinguished (‘control’, ‘use’ and ‘protection’) for most periods more than one of these objectives applied to a taxonomic group. Moreover, for birds, mammals, fish and also molluscs, species subject to ‘protection’ were, on average, smaller than the species that were subject to ‘use’ throughout the period studied. In addition, protected bird, mammal and mollusc species were, on average, smaller than the species subject to ‘control’ for most of the periods analysed. In contrast, protected insect species were, on average, larger than the insect species subject to ‘control’ or ‘use’.

In Chapter 5, which reported the results of the experimental study on the conservation attitudes of Dutch NGOs, it was shown that the relative size of species had a significant effect on the judgements of the NGO representatives. On average, the continued existence of relatively large species was judged to be more important than that of relatively small species within the same taxon, and NGOs were judged to agree more with conservation measures for relatively large species than with measures for relatively small species within the same taxon.

Thus, the studies reported in Chapters 3 and 5 revealed that size obviously did matter in relation to conservation tendencies. That is, the extent to which species were subject to certain objectives of species-specific national legislation, including the objective ‘protection’, was related to a species’ relative size within a taxon, as was the judged willingness of major national NGOs to support public conservation measures for species.

However, at first glance, the results of the two studies seem contradictory. As expected, in the experimental study, willingness to conserve was, on average, found to be higher for larger species, which included birds, mammals, insects and gastropods. However, when considering these taxa in species law on birds and mammals (and also molluscs), protected species were, on average, persistently smaller than the species of these taxa subject to ‘use’ or ‘control’. Only with respect to insects were protected species, on average, larger than those subject to ‘use’ or ‘control’.
As argued in Chapter 2, the differences may be explained as follows. Species law mainly regulates the *taking of individuals of species*. Interests directed towards protection and interests concerned with the use of species are likely to have competed for the same species. Larger species are likely to have been perceived as more valuable to take than smaller ones. At the same time, the societal willingness to protect only developed gradually. Over time, the resulting societal forces may have tended to support maintaining the use of larger species, and to eventually give up the use of smaller species in favour of conservation interests. In contrast, the experimental study concerned the willingness of actors to support the *protection of habitats of species*. In this case, the protection of larger rather than smaller species is less likely to further interfere with other interests, and larger species univocally evoked a greater willingness to conserve amongst all actors.

**Historical changes in taxon-related and size-related patterns**

Although the invariate species characteristics taxon and size are likely to affect patterns in public decisions regarding species, possible taxon-related and size-related patterns in decisions are also likely to be subject to historical change related to societal and, possibly, ecological developments. Therefore, the second specific research question of this thesis was to assess how taxon-related and size-related patterns in public decisions regarding specific species may change over time. In relation to taxa, the issue was investigated in Chapter 2 and in the study underlying Chapter 4, while Chapter 3 investigated size-related patterns.

In Chapter 2 it was shown that historical changes in the involvement of species in law varied with taxa and with the legal objectives distinguished. The total number of species subject to legislation aimed at 'control' gradually increased until 1953, after which it decreased, particularly from 1977 onwards. 'Control' persistently applied to mammals, birds and insects. However, until 1991, this occurred to a decreasing extent for mammals and an increasing extent for insects. For 'use', the total species numbers involved increased from 1911, reaching a first peak in 1922, before decreasing, and then increased again from 1944 to reach a second but lower peak in 1991, subsequently decreasing once more. Birds, mammals, fish, bivalves and crustaceans were already subject to 'use' before the end of the nineteenth century, gastropods and cephalopods followed in the twentieth century, and all these taxa remained permanently subject to 'use' following their appearance in law. Amphibians and insects were only temporarily involved. Over time, birds and fish together accounted for 80–90 percent of the species subject to 'use', but to a substantially decreasing extent for birds and a substantially increasing extent for fish. Other taxa showed less obvious trends. Until 1880, 'protection' was only applicable to one species. Since then the number of protected species has increased steadily, particularly after the years 1914, 1973 and 1991.
In contrast to the proportions of most taxa under ‘control’ and ‘use’, taxon proportions of protected species developed irregularly and the successive incorporation of taxa took a much longer period. Mammals were included in 1880, amphibians in 1914, and reptiles, fish, insects, crustaceans and gastropods in 1973.

In the study underlying Chapter 4, the combined sample of Study 1 and Study 2 (see Chapter 4) was also used to identify possible trends in the frequency with which various taxa were included in EISs over time. Although not reported in Chapter 4 itself, analysis revealed that most taxon frequencies varied somewhat over time, but no significant linear trends emerged for the period analysed.

In Chapter 3 it was shown that throughout the period studied the average size of the protected bird, mammal, and amphibian and reptile species considered increased, and to some extent that of fish species did so as well. For ‘use’ and ‘control’, no such general patterns could be observed. As argued in Chapter 3, the increasing average size of species subject to ‘protection’ may have been the result of the addition of new – large – species to regulation as well as due to transfers of large species from ‘use’ or ‘control’ to ‘protection’.

Thus, over a longer period of time, analyses of Dutch law revealed historical changes in the legal status of species and these changes affected species of different taxa or sizes differently. This was particularly the case for the objective ‘protection’, for which different taxa became successively incorporated over a long period of time, and which generally first applied to, on average, the smaller species within the taxa, with the exception of insects. In addition, in relation to ‘use’, changes were particularly apparent for fish and bird species, the proportions of which increased and decreased respectively.

A brief explanation for the historical patterns observed in species legislation is that there were long-term underlying societal changes in attitudes towards protection. It is conceivable that several values assigned to species by given interests (e.g., aesthetic values of a bird species to bird protectionists) – insofar as these were influenced by the perception of invariable species characteristics such as taxon and relative size – remained relatively unchanged, while the societal positions of certain interests regarding particular species groups was more changeable over time. As a result, in successive policy cycles, legislators gradually incorporated more taxa into protective legislation as well as the larger species within certain taxa. This explanation is further discussed in Section 6.2.

**Demands and support of different actors or interests in public species conservation**

Different actors or interest groups may differ in their demands regarding public decisions on the conservation of specific species. The demands are likely to be affected by the societal characteristics of an actor, including their spheres of interest and the biological
characteristics of the species in question, as well as the values assigned to species by the actor. The third specific research question of this thesis asked what demands are made and what support is given by different actors or interests in public species conservation primarily as a function of species’ taxon and species’ size, and secondarily in relation to species’ population characteristics. This issue was investigated in Chapters 4 and 5.

In Chapter 4 the apparent demands and influence of different EIA actors in species inclusion in EIAs were inferred. The results indicated that (a) *EIA working groups of independent experts* were the most influential in determining the data to be used; (b) on average, *proponents* included data more often than required by guidelines; however, generally in a similar pattern when considering the different taxa included; and (c) in 30–40 percent of the EIAs, the participation of *nature NGOs* prompted the use of data.

In Chapter 5, which reported the results of the experimental study on conservation ‘attitudes’ of Dutch NGOs, it was shown that the representatives’ NGO had a significant effect on the judgements. On average, the importance to an NGO of the continued existence of species and the agreement of an NGO with conservation measures for species, was judged to be highest for the *nature conservation* NGO, followed by the *mobility and recreation* NGO and the *agriculture* NGO respectively. Support for measures was also found to depend on interests harmed by the measures (own versus another’s) and was, on average, lower if the measures injured the interests of the representatives’ own NGO. However, the variables of taxon and relative size (see above) and interests harmed were found to affect the judged opinions of all NGOs similarly.

Furthermore, in a postexperimental questionnaire, participants rated the judged importance to their NGO of 30 different species-related attributes to establish the NGO’s support for public conservation measures that resulted in local disadvantages to the interests of their NGO. The three NGOs were found to differ considerably in the attributes judged as important for support. Furthermore, in contrast to the experimental results, participants from all three NGOs judged taxon and size as relatively unimportant for NGO support of conservation measures, while rarity was relatively important.

Thus, the results show that different actors, that is, *EIA working groups of experts* who produced guidelines and *proponents* who produced EISs, as well as different interest groups, that is, NGOs concerned with either nature conservation, mobility and recreation, or agriculture, tend to have similar conservation ‘preferences’ regarding species of different taxa or relative size. However, the general extent of their conservational concern may vary, that is the frequency with which the actors prompted the incorporation of species data in EIAs, or the support for hypothetical conservation measures the actors (i.e., NGOs) were judged to have.

Other studies also showed that different societal groups may have similar responses to different animal species groups, whereas the average strengths of their responses may vary depending on the societal group. Norwegian adolescent boys were found to show similar preferences for 20 different animals; however, the average scores of
boys participating in animal-related activities were higher than those of boys who rarely or never participating in the activities (Bjerke et al. 2001). Likewise, Australian animal rights supporters, members of the urban public and farmers were found to have similar scores for beliefs about the extent to which species of four different taxa may have mental experiences – scores which correlated with those for empathy for the animals – however, the average scores of animal rights supporters were highest, followed by those of the urban public and then farmers (Hills 1995). Nonetheless, as is suggested by several studies, in cases where particular species or measures related to species seem to harm the interests of certain groups, these groups often clearly show less favourable attitudes to the species or measures (Buys 1975; Kellert 1985b; Bath & Buchanan 1989; Carr & Tait 1991; Bjerke & Kaltenborn 1999; McKinstry & Anderson 1999; Williams et al. 2002; Bandara & Tisdell 2003; Conforti & de Azevedo 2003; Ericsson & Heberlein 2003; Moore 2003; Naughton-Treves et al. 2003; Tonder & Jurvelius 2004).

Furthermore, the postexperimental assessment (Chapter 5) indicated obvious differences between different NGOs in the species-related attributes that were explicitly judged to be important for NGO support of conservation measures. These findings agree with the results of a survey among US citizens in which participants showed conservation preferences for certain taxa, and also explicitly judged ecological attributes such as the rarity of species to be more important than physical attributes such as the body size of species, in their prioritizing of species for conservation (Czech et al. 1998).

**Methodological approaches**

The fourth specific research question of this thesis concerned developing new methodological approaches to overcome the limitations of previous research. One limitation was that historical developments in species law have usually been described in anecdotal or qualitative terms. Although some quantitative analysis has been undertaken, it typically concerns a single act and a limited period of time. In this thesis, the numbers of species subject to law were assessed by year for almost a 140 year period, for different taxa and for different legal objectives, and examined in terms of body size. The method enabled the production of a comprehensive longitudinal image of the relative involvement of taxa and species of different relative sizes in a country’s national species law. Another limitation in previous research is a lack of clarity with respect to how studies on the relative attention paid to species or species groups in Environmental Impact Assessments (EIAs) deal with the variability of species descriptions that may appear in the texts of EISs. For this thesis, a relatively unambiguous approach was developed using the species-specificity of animal names as a measure of the relative attention paid to species in texts.
The research strategy of this thesis was to investigate the central research question by studying different cases and following different research approaches, including longitudinal as well as cross-sectional analysis. In all three cases investigated, however, the independent variables were similar, that is, wild animal species indigenous to the Netherlands, and the different contexts were all related to public decisions regarding conservation of the species. The strategy was found to have two advantages. Firstly, the different research approaches were to a certain extent complementary. The limitations of one approach could to a certain extent be compensated for by another approach, thus yielding a more comprehensive overall picture of the possible role of species characteristics in public decisions. For example, by analysing species law, the probable role of taxon and relative size could be studied longitudinally, yet the approach was only descriptive. In contrast, the cross-sectional study on NGO attitudes, albeit limited to a given moment in time, allowed experimental testing of the variables’ effects. Secondly, by investigating different contexts it became apparent that one and the same species characteristics may have different effects on the likelihood that species will be conserved. For example, in the context of habitat conservation, the experimental study showed that the willingness to conserve species was, on average, greater for larger species within a taxon. In contrast, analysis of species law, which largely involved the regulated taking of species, showed that for several taxa, legally protected species were, on average, smaller than the species subject to the objectives of ‘control’ or ‘use’.

6.2 The findings from the perspective of the central research question

In Section 6.1, the specific research questions formulated for this thesis and the corresponding results of the studies conducted were discussed. Below, the findings of the thesis are discussed in the broader perspective of the central research question.

As argued in Section 1.1, the current greatly increased, anthropogenically driven extinction rates of wild species, which possibly mark a new mass extinction episode, may be considered to constitute a major environmental problem. Loss of species may imply a serious and irreversible reduction of our future options. Although every single species, including the less appealing ones, might be well worth saving, societal conservation choices seem inevitable (‘Noah’s Ark Problem’), including at a national level. In Section 1.3, the following categories of factors of potential importance for public decisions regarding wild animals species were discussed:
The characteristics of animal species (and, implicitly, knowledge related to the characteristics)

The sociocultural context, including values related to the species, characteristics and involvement of relevant societal actors and their related interests, and the possible importance of historical change.

Subsequently, in Section 1.4 the general research question was formulated with a focus on the first and, additionally, on the second category of factors: To what extent are perceivable species characteristics and related assigned values of species likely to affect conservation-related public decisions regarding specific wild animal species?

In Section 6.1, it was concluded that the likelihood that public conservation-related decisions would favour certain species obviously and persistently, varied with the invariate species characteristics of taxon and relative size. However, the possible effects of other species characteristics on conservation-related decisions, for example, characteristics apparent at lower taxonomic levels, or food habits affecting human interests, remained uninvestigated. Moreover, the longitudinal analysis of legislation showed revealed time-dependent variation in the likelihood that public conservation-related decisions would favour certain species. However, the underlying changes in the historical and societal contexts were not investigated. Therefore, other probable species characteristics involved and probable historical and societal factors affecting public decisions over time will be considered below. In short, the discussion below will examine the possible importance of invariate species characteristics relative to the other factors discussed above.

Characteristics of species’ individuals and populations

Having demonstrated that there is an obvious role for taxon and relative size in public decisions regarding species conservation, a question remains concerning how important these variables are relative to other species-related variables. Since the research for this thesis primarily considered species’ taxon and relative size, and secondarily, rarity, less light was shed on the possible role of other types of species characteristics. These include behavioural and ecological characteristics of species’ individuals and types of population characteristics other than rarity.

Of the behavioural and ecological characteristics of species’ individuals, the food preferences of species perceived as detrimental to human interests are a potentially important variable. De Klemm and Shine (1993, p. 108) reported that in many countries actively destructive measures were either encouraged or were frequently made mandatory with respect to animals considered harmful to crops, livestock or game. Although the authors also observed a gradual evolution away from legislation outlawing species – in order to prevent the extinction of such species – this does not imply a tendency towards the unconditional
protection of species perceived to be harmful. For example, the EU Habitats Directive of 1992 permits the derogation from provisions aimed at protection ‘to prevent serious damage, in particular to crops, livestock, forests, fisheries, and water and other types of property’. Moreover, despite an increasing tendency to protect large carnivores such as wolves *Canis lupus*, their conservation or recovery may still coincide with negative responses, for example in Western Europe (Williams *et al.* 2002). Nevertheless, over a 140 year period, ‘control’ only applied to a minority of species in Dutch species law, and relatively extensively to insects (Chapter 2). Although the majority of wild species in the world are insects, only 0.5 percent are considered harmful (Van Lenteren & Dicke 2006). For these reasons, with the obvious exception of certain species groups, it is assumed here that for the majority of species, food preferences being detrimental to human interests are unlikely to be a major consideration in public decisions on species.

The role of population characteristics in relation to a species’ legal status has already been discussed to some extent (Chapter 2). Finding correlative evidence of such a role is difficult due to a lack of historical population data. In some cases, such as in the US Endangered Species Act (ESA), *the endangerment of a species*, is an obvious argument for its public protection. However, even in this case, species of certain vertebrate taxa as well as species with a greater physical length are significantly more likely to be listed (Metrick & Weitzman 1998). In addition, population changes may affect decisions in different ways. For species which evoke affection or which we use, *decreasing population sizes* in particular may enhance *tendencies to protect* the species (or to regulate their use by, e.g., the closing of hunting or fishing seasons). In contrast, for species perceived as detrimental, *increasing population sizes* in particular may enhance *tendencies to control* the species.

The three legal objectives distinguished in this thesis, (a) ‘control’, (b) ‘use’ and (c) ‘protection’, appear to correspond well to three of four principle positions in an attitudes-to-animals concept developed by Serpell (2004) (see Fig. 1.1), that is, (a) animals perceived as detrimental to human interests, (b) animals perceived as beneficial to human interests and (c) emotional responses to animals involving love, sympathy or identification, respectively. However, the fourth principle position in Serpell’s concept, (d) emotional responses to animals involving fear, loathing or disidentification, does not seem to correspond to one of the legal objectives distinguished. With the exception of large carnivores that may both be perceived as harmful and may evoke fear related to a perceived threat to humans themselves (Røskaft *et al.* 2003), species only evoking fear generally do not seem to be subject to publicly regulated ‘control’. However, fear-evoking taxa such as spiders may well be less likely candidates for public conservation when compared to more or less related taxa such as insects. For example, the US ESA list of protected species currently only includes 12 arachnids as compared to 61 insects, while under Annexes II and IV of the EU Habitats Directive respectively, 1 arachnid as compared to 97 insects, and 1 arachnid as compared to 88 insects are protected (U.S. Fish & Wildlife Service 2007; European Commission 2007).
In summary, taxon and relative size will generally have a relatively important role in public decisions regarding species. These characteristics will most strongly affect the assigned values of species related to benefit, affection or concern, as well as the corresponding political demands regarding the use and protection of the species. In addition, in some cases food preferences that are detrimental to human interests may play a role. However, these characteristics will most strongly affect the assigned values of species related to detrimental effects and the corresponding political demands regarding the control of the species.

Population changes may also contribute in different ways. Decreasing population sizes may in some cases positively affect the assigned values of species related to affection or concern, as well as the corresponding political demands regarding the protection of species. Finally, fear-evoking characteristics may play a role. However, generally, fear-evoking characteristics alone do not relate to certain societal interests and corresponding political demands. In the present context, fear-evoking characteristics may be considered to represent negative dimensions of assigned values related to affect or concern. As a result, corresponding demands to protect the species are likely to be inhibited. Fear-evoking characteristics may be closely related to taxon and size, such as in the case of spiders and snakes. In such cases, the characteristics may be considered to be only a dimension of taxon and size.

**Historical changes in public decisions on species**

To some extent, the possible origins of historical variation in public decisions have already been highlighted in Chapter 2 and in Section 6.1. However, let us further consider the problem here by looking more closely at the case of Dutch species legislation from 1857 to 1995 investigated in Chapters 2 and 3, in particular with respect to the assigned values of species, societal changes and the positions held by interests over time.

**The assigned values of species**

Another question to be considered when judging the probable importance of invariate species characteristics relative to the other factors proposed above, is the possible consistency or changeability of the different assigned values of species and their characteristics. When delving deeper into the data set of birds in particular, as obtained for the analysis in Chapter 3, the extent of the shifts in the legal status of individual bird species over the period 1857–1995 becomes apparent (Fig. 6.1). In addition to the legal objectives of ‘control’, ‘use’ and ‘protection’ distinguished in Chapter 2, a fourth objective, ‘neutral’, is defined here to apply to bird species that were not subject to legislation (i.e., to the Hunting Act 1857 or the Useful Animals Act 1880). Not counting the 9 new species which appeared during the period investigated, and including the category ‘neutral’, a total of 440 such shifts were recorded for the period (Fig. 6.1).
Table 6.2  The status of the common starling, *Sturnus vulgaris*, under Dutch species legislation in the period 1857–1995

<table>
<thead>
<tr>
<th>Date</th>
<th>Legislation</th>
<th>Objective</th>
<th>Formal status or motive</th>
</tr>
</thead>
<tbody>
<tr>
<td>1857–1880</td>
<td>Not subject to legislation</td>
<td>N</td>
<td>-</td>
</tr>
<tr>
<td>1880–1892</td>
<td>Useful Animals Act 1880 decision</td>
<td>P</td>
<td>‘Also at all times considered useful for agriculture or forestry’</td>
</tr>
<tr>
<td>1892–1893</td>
<td>Not subject to legislation</td>
<td>N</td>
<td>-</td>
</tr>
<tr>
<td>1893–1914</td>
<td>Useful Animals Act 1880 decisions</td>
<td>P</td>
<td>‘Also at all times considered useful for agriculture or forestry’</td>
</tr>
<tr>
<td>1914–1922</td>
<td>Bird Act 1912 decisions</td>
<td>U</td>
<td>Permits may be given to catch, possess, sell, etc. birds for cages</td>
</tr>
<tr>
<td>1922–1936</td>
<td>Bird Act 1912</td>
<td>P</td>
<td>Protected bird species</td>
</tr>
<tr>
<td>1936–1995</td>
<td>Bird Act 1936 decisions</td>
<td>C</td>
<td>‘Prevention of damage in agriculture, horticulture or forestry’</td>
</tr>
<tr>
<td>1994–1995</td>
<td>Bird Act 1936 decision</td>
<td>U</td>
<td>Allowed to possess, etc. for cages</td>
</tr>
</tbody>
</table>

Figure 6.1  Shifts in the legal status of indigenous bird species in the Netherlands over the period 1857–1995. Key: bold arrows, directions of main shifts; numbers near arrows, numbers of times that a species shifted from one legal main objective to another during the period; numbers with a plus sign, species added to Dutch fauna after 1857; upper numbers in ellipses, species numbers subject to the objective at the beginning of the period (1857); lower numbers in ellipses, species numbers subject to the objective at the end of the period (1995); U/P, species simultaneously subject to ‘use’ and ‘protection’; U/C, species simultaneously subject to ‘use’ and ‘control’.
In addition to the changeability of the legal status of birds, the shifts also show overall tendencies, such as a net tendency towards ‘protection’ (Fig. 6.1). Apparently, at the level of public decisions, assigned values related to conservation tendencies became more predominant in Dutch society. However, the shifts do not imply that, at the level of given interests, the assigned values of specific bird species had generally also been shifting to such an extent, at least not as far as the values may be influenced by the characteristics of the species. For example, during the 1857–1995 period, the legal status of the common starling *Sturnus vulgaris* shifted seven times, and the legislator sometimes considered the common starling to be ‘useful’, sometimes ‘neutral’, sometimes valuable as cage birds, sometimes, apparently, as worthy of being protected, and sometimes ‘harmful’ (Table 6.2). However, in relation to specific interests over the same period, assigned values of the common starling, in relation to their characteristics, seem to have been fairly constant. For example, over time, common starlings simultaneously had food habits that were harmful and food habits that were useful to agricultural interests (Gallacher 1978, p. 156). Likewise, common starlings had aesthetically appealing characteristics that made them valuable to keepers of cage birds, not only in periods when common starlings were explicitly listed as cage birds (see e.g., Davids 1989, p. 42).

At the same time, assigned values are conceived of as depending on several factors, including the valuator’s external situation as well as the social setting of the valuation (Brown 1984). Consequently, also at the level of particular interests, the assigned values of specific species may be subject to change. Examples are insects such as the asparagus fly *Platyparea poeciloptera*, which despite their food preferences, were taken off the list as they were no longer considered to be a threat to agricultural interests due to the availability of new control methods (see Chapter 2).

In summary, the assigned values of specific species may change at the societal level (i.e., at the level of public decisions), but may simultaneously remain rather constant at the level of particular interests. The latter may be related to certain permanent characteristics of the species that are relevant to their valuation by such interests. Nonetheless, for given interests, assigned values of specific species may be subject to change due to external or societal factors.

**Societal changes**

As argued above, birds, for example, show an overall tendency towards ‘protection’. In Chapter 2, it was argued that the tendency was also likely to be the result of changes in ethical perspectives and human-species relationships. However, to what extent did changes in the specific Dutch historical context affect the legal status of wild animal species? To approach this problem, and following Davids (1989, p. 31–70) and Van Zanden (1993d), four periods will be briefly considered: the period 1600–1850, which preceded the period analysed, and the periods 1850–1914, 1914–1960 and 1960–1995, which basically follow developments in legislation.

In the period 1600–1850, prior to the period analysed in the legislation case, the driving forces behind the use of wild or other animals essentially remained unchanged.
in relation to the preceding period (Davids 1989, p. 65). Around 1850, the use of wild animals by the Dutch rural population was still driven by poverty and not inhibited by psychological barriers (Van Zanden 1993a). Nevertheless, from the end of the sixteenth century, signs of a greater consideration for individual animals became apparent (Davids 1989, p. 66). As Thomas (1983) observed in the case of England, and also in the Netherlands, this increasing consideration partly had a Calvinistic origin. For example, churches opposed pulling off the heads of live geese as public entertainment. Another reason for increasing consideration may have been high levels of urbanization in the Netherlands. Urban citizens were less dependent on wild animals and could therefore show greater consideration (Thomas 1983; Davids 1989, p. 67–68).

In the period 1850–1914, the societal context in the Netherlands changed considerably with respect to relationships between humans and animals or nature. Industrialization, population growth, increasing urbanization, widespread construction of canals, tram and railway lines, fertilizer use and reclamation of farmland increasingly affected the Dutch economy, landscape and people's mobility (Davids 1989, p. 84–87; Verstegen 1993c; Van der Windt 1995, p. 39–40). Nonetheless, until the twentieth century, less urbanized areas were still subject to natural dynamics to a reasonable extent (Verstegen 1993c). Concern for animal welfare and sensitivity to nature and its conservation in the Netherlands seemed to lag behind several other countries (Davids 1989, p. 69; Van Zanden 1993d; Van der Windt 1995, p. 39). For example, the Nederlandse Vereniging tot Bescherming van Dieren (Dutch Society for the Protection of Animals) was founded in 1864, 40 years after the founding of the Society for the Prevention of Cruelty to Animals in the UK (Davids 1989, p. 97; Royal Society for the Prevention of Cruelty to Animals 2009). The NGO supported the launch of the Useful Animals Act of 1880 (Davids 1989, p. 138; Van der Windt 1995 p. 43–44), an act which demonstrated a developing interest in nature and its conservation in the Netherlands. Enthusiasm for catching finches for the pleasure of privileged citizens decreased, while the popularity of bird-watching increased (Davids 1989, p. 52 and 95; Van Zanden 1993d). Increased mobility enabled urban dwellers to visit natural habitats. In 1896, the Dutch ecological journal De Levende Natuur was founded, as were the Nederlandse Vereniging tot Bescherming van Vogels (Dutch Society for the Preservation of Birds) in 1899, the Koninklijke Nederlandse Natuurhistorische Vereniging (Royal Dutch Society for Natural History) in 1901 and the Vereniging tot Behoud van Natuurmonumenten in Nederland (Society for the Preservation of Nature in the Netherlands) in 1906 (Van der Windt 1995, p. 25–64). However, at the same time, the utilization of species and nature also had its advocates. In 1874, the predecessor of the current Koninklijke Nederlandse Jagersvereniging (Royal Netherlands Shooting Association) was founded (Koninklijke Nederlandse Jagersvereniging 2009). In 1899, the Staatsbosbeheer (State Forest Service) was founded, aiming to undertake reclamation activities and forest management. Finally, by the end of this period, the Bird Act and the second Useful Animals Act had also been passed.
In the subsequent period of 1914–1960, public concern for the issue of nature conservation was low due to the economic depression during the 1930s, the Second World War and the period of post-war reconstruction (Van Zanden 1993d). At the same time, pressures on the environment and landscape increased considerably. The Dutch population further increased and cities expanded. From 1928, national roads were constructed and in the post-war period the numbers of cars increased greatly, both causing serious habitat fragmentation. Simultaneously, agriculture intensified, as did related fertilizer and pesticide use, while there were decreases in groundwater levels and increasing land consolidation. Estuaries were closed off from the sea and the pollution of rivers and the North Sea continued (Verstegen 1993a, 1993b, 1993c).

In the period 1960–1995, concern for environmental problems developed and there was a renewed interest in nature conservation. The Nature Conservation Act 1967 and corresponding orders from 1973 marked the renewed legal protection of mammals and amphibians in addition to birds and, for the first time, the protection of species of several other taxa, including plants. A considerable number of new environmental and nature NGOs appeared, particularly in the 1970s (Tellegen 1983; Leroy 1985; Cramer 1989, 1991). These included the *Landelijke Werkgroep Kritisch Bosbeheer* (National Working Group for Critical Forest Management), advocating ‘natural’ forest ecosystems, including the reintroduction of ‘natural’ predators such as wolves (Van der Windt 1995, p. 164–212), and the *Stichting Kritisch Faunabeheer* (Foundation for Critical Fauna Management) that became both an exponent of conservation and a driving force behind anti-hunting attitudes in the Netherlands (Dahles 1990, p. 49). During the period, memberships of established nature preservation NGOs, such as the Society for the Preservation of Nature in the Netherlands and the Dutch Society for the Preservation of Birds considerably increased (Fig. 6.2).

The brief overview above illustrates the changes in Dutch society relevant to species legislation, in particular prior to and during the period investigated. Without doubt, these developments shaped Dutch species legislation, including conservation legislation. The developing interest in nature and its conservation in the 1880–1914 period parallels the launch of the Useful Animals Acts 1880 and 1912, and the Bird Act 1912. With the exception of the replacement of the Bird Act in 1937, relative disinterest in these issues during the 1914–1960 period parallels the absence of real developments in conservation legislation. Finally, the developing environmental concern and renewed interest in nature conservation during the 1960–1995 period parallels the launching of the Nature Conservation Act 1967, major changes in the Bird Act 1936 and Hunting Act 1954 and the subsequent launching of the Flora and Fauna Act 1998 (which has been omitted from this analysis). Over time, there was a tendency towards the conservation of an increasing number of species from an increasing number of taxonomic groups, for an increasing number of reasons. The periods identified above appeared to have been stepping stones in an expanding ethical concern for wild animals in Dutch society. As was argued in Chapter 2, similar developments have been
seen in other countries, both in relation to objective trends in legislation (Bean 1977, p. 447; De Klemm & Shine 1993, p. 84) and simultaneous shifts from ‘utilitarian’ to more ‘ecocentric’ views in society (Kellert 1985a; Wildes 1995). In addition, the Dutch Flora and Fauna Act 1998 formally acknowledged the intrinsic value of animal species.

Thus, in addition to a certain continuity in the assigned values of species, there seems to be a tendency towards a greater appreciation of other values. This reflects what has been described by historians as a growing moral concern in Western society, in response to several societal changes (Thomas 1983). Ethicists have referred to this process as an expanding moral circle: an expansion from concern for humans from one’s own tribe to a concern for other humans, domestic animals and ultimately wild animals (e.g., Singer 1981; Callicott 1989, p. 16).

**Positions held by interests over time**

Differences in the influence of particular Dutch societal interests are likely to have shaped Dutch species law in several cases. The launch of the Useful Animals Act in 1880 and the incorporation of the interests of landowners into the Hunting Act of 1923 are believed to be related to an increase in political influence of agricultural interests and a decrease in the political influence of the nobility and the upper classes, as well as hunting interests related to these groups from the second half of the nineteenth century (Davids 1989, p. 86; Dahles
Figure 6.3 Proposed factors affecting a political actor's political demands or support regarding public species policy.
In the period 1833–1913, agriculture became more important due to the expansion of agricultural land and the introduction of fertilizer, particularly after an agricultural crisis during the period 1875–1895 (Van Zanden 1993c; Van der Windt 1995, p. 40). The Useful Animals Act 1880 protected species regarded as ‘useful’ to agriculture. The Hunting Act of 1923 considered several species as ‘harmful’ to agriculture and manor hunting rights were abolished, while hunting rights were linked to owning land. Likewise, the removal of several game species from hunting legislation and their subsequent protection from 1954, as well as the elimination of the category ‘harmful animals’ from hunting legislation in 1977, is believed to have been the result of an increase in the political influence of nature protection interests, including the Society for the Preservation of Nature in the Netherlands referred to above (Dahles 1990, p. 193).

As a part of an actor’s available resources, membership of an NGO may be regarded as a more specific condition for their success in influencing public policy, in addition to other conditions (e.g., Herweijer 2008). In Chapter 2, it was argued that over time the relative positions of NGOs in terms of membership and influence may differ and that such differences may well have influenced major trends in species law. Indeed, for the 1900–2005 period, the memberships of the main established Dutch NGOs concerned with the issue of species or nature conservation varied, including over time (Fig. 6.2). For example, in 1910, the Society for the Preservation of Nature in the Netherlands and the Society for the Preservation of Birds had similar memberships. However, between 1995 and 2005, the former had become seven to eight times larger than the latter (Fig. 6.2). Furthermore, the NGOs associated with ‘protection’, that is, the two societies just mentioned and the Dutch Society for the Protection of Animals continued to grow until 1995. In contrast, the membership of the NGO associated with ‘use’ (i.e., hunting birds and mammals), that is, the Royal Netherlands Shooting Association, reached a maximum at the end of the 1980s. Moreover, in the period 1995–2005, memberships of the NGOs associated with ‘protection’ were on average 6 to 46 times larger than those of the hunting NGO (Fig. 6.2).

A brief summary of proposed factors involved in political demands regarding public decisions on specific species

The following offers a brief summary of the main factors proposed here to be involved in influencing public decisions regarding specific species in pluralist societies, including conservation decisions. The proposal is based on previous studies which are predominantly concerned with explaining individuals' responses to species (see Chapter 1), and the results of this thesis, which concerned the level of public decision-making (Chapters 2–5), as well as the discussion of these results above. In pluralist societies, political actors, including NGOs, are considered to have an important influence on public decisions on species.
Consequently, the focus here is on the factors, including species-related factors, affecting a political actor’s political demands or support regarding public species policy (Fig. 6.3). Political demands imply claims that adaptation or continuation of policy will enhance results. Political support may have various manifestations, such as voting for political parties or complying with regulations (Hoogerwerf 2008). It is proposed here that the political demands or support of an actor are affected by at least three factors: (a) the type of interests of an actor (i.e., type of NGO – in Chapter 5), (b) the assigned values of a species to an actor, and (c) the perceived extent to which the actor’s interests are at stake (e.g., the perceived extent to which an actor’s own interests are harmed; see Chapter 5). Furthermore, the context in question will also affect an actor’s demands (see Section 1.3). This may include the specific human-animal relationship (Kellert 1996, p. 100), for example, the control of a species due to its capacity to damage crops. In addition, an actor’s demands (i.e., input into the political system) will also be affected by current policy regarding the species – that is, the existing output of the political system regarding the species and the perceived effects of that policy (Hoogerwerf 2008). In turn, the values assigned to the species by an actor are also affected by the characteristics of the species, including species’ individuals (e.g., taxon or size) and populations (e.g., rarity) (see also Section 6.2.1). Finally, the type of interests that an actor has will affect the values that the actor assigns to the species.

### 6.3 General conclusions

The first conclusion of this thesis is that the taxonomic group to which wild animal species belong affects the likelihood that the species will be subject to public conservation-related decisions regarding the species. Moreover, based on the cases and species investigated for the Netherlands, the taxa that showed the greatest likelihood for species being subject to public conservation-related decisions appeared to show considerable similarities irrespective of the precise context (i.e., species law, Environmental Impact Assessments, or rated support of interest groups for habitat conservation). It is probable that perceivable taxon-specific physical body characteristics such as morphology, size and locomotion, as well as taxon-related behavioural aspects, affect this likelihood.

The second conclusion is that in public conservation-related decisions the relative body size of a species within a taxon matters to a comparable extent to a taxonomic group. The way in which species’ relative size affects the likelihood that species will be conserved seems context-dependent. In species law, which usually regulates the taking of species’ individuals, smaller species within taxa were, on average, more likely to be subject to legal protection against taking than larger species. This was the case for most taxa that were involved in both ‘use’ and ‘protection’. In contrast, when considering the public protection of species’...
habitats, representatives of major NGOs rated the willingness to support such protection, on average, higher for larger species within taxa.

The third conclusion is that when considering the interests of organizations and their standpoints regarding possible public choices in species-specific conservation, there may be a considerable discrepancy between what these organizations explicitly tell us are the important factors behind such choices and what implicitly influences their support for one or the other choice. This became apparent when comparing the results of unobtrusive experimental assessment versus the results of postexperimental assessment, both concerning the importance of species characteristics in relation to organizational attitudes towards public conservation measures.

The fourth conclusion is that over a long period of time there were both consistencies and changes in the extent to which species from different taxa or of different average relative size were subject to the legal objectives distinguished (i.e., ‘control’, ‘use’ and ‘protection’). There were persistent differences in the taxa that were involved in the legal objectives as well as in the relative extent to which these taxa were affected by long-term trends in the numbers of species subject to these objectives. Persistent differences were also apparent for the average sizes of species within taxa that had been subject to certain objectives (in particular, species subject to ‘protection’ were often persistently smaller than those subject to ‘use’ or ‘control’). Moreover, long and short-term changes in the number of species within a taxon subject to legal objectives show that different species within one taxon were not regarded similarly over time. There was also a process in which less preferred taxa were step-by-step and cumulatively included in legislation aimed at ‘protection’. Likewise, the results show that for several taxa, the average size of species subject to ‘protection’ increased over time. The developments correspond with long-term societal changes in ethical perspectives regarding human-species relationships, where the positions of interests related to nature conservation or animal protection have become more powerful and those related to species use have become less powerful over time.

The fifth conclusion is that the research strategy of this thesis, which was designed to investigate the central research question by following different research approaches and studying different cases and contexts, had its advantages. Firstly, applying both longitudinal and cross-sectional approaches yielded a more comprehensive overall picture of the possible role of species characteristics in public decisions. Secondly, by investigating different contexts it became apparent that one and the same species characteristics, in particular species’ relative size, may have different effects on the likelihood that species will be conserved. This thesis further applied some new methodological approaches that proved to be useful. These included the longitudinal assessment of the numbers of species subject to law, in terms of different taxa and objectives and including body size. The method enabled the development of a comprehensive and dynamic image of the relative extent to which taxa were subject to different legal objectives in one country’s national species law and of the average sizes of the species subject to the objectives.
6.4 Some implications and recommendations

As mentioned above, to date, 191 parties have endorsed the Convention on Biological Diversity 1992. This convention aims to conserve a wide range of biodiversity, which also includes the species of such ‘cryptobiotic’ groups as soil fauna (Decaëns et al. 2006). However, as was shown here in the case of the Netherlands, and as has been shown elsewhere (Bean 1977; De Klemm & Shine 1993, p. 84; Bean & Rowland 1997), societies may show strong preferences for certain animal taxa when protecting specific species, particularly birds and mammals, despite a gradual evolution towards also protecting less preferred taxa. However, several studies, notably those concerned with insect groups, have shown that threats to groups other than birds or mammals may be severe or even surpass those posed to vertebrate groups (e.g., Thomas & Morris 1994; McKinney 1999; Thomas et al. 2004; Biesmeijer et al. 2006; Carvell et al. 2006; Wenzel 2006; Samways 2007). Furthermore, even such groups as protists might be vulnerable to threats, as many protists appear to have restricted rather than ubiquitous and cosmopolitan distributions (Cotterill et al. 2008).

Unfortunately, a conservation focus on birds or mammals, particularly one that safeguards their habitats, may often not adequately cover other taxa. As mentioned above, many studies show a varying or low congruence in species distributions in relation to different taxa and their hotspots (e.g., Kremen 1992; Oliver & Beattie 1996; Moritz et al. 2001; Schouten 2007). Several of these studies included birds or mammals in the taxon sets analysed (e.g., Schall & Pianka 1978; Prendergast et al. 1993; Howard et al. 1998; Reid 1998; Van Jaarsveld et al. 1998; Rey Benayas & De la Montaña 2003). Low congruence in the species richness of different taxa has been attributed to taxon-related differences in habitat preferences, migratory habits, reproductive strategies and other life-history characteristics, as well as related responses to environments (Flather et al. 1997; Fleishman et al. 2005).

The experimental study in Chapter 5 also showed that NGOs, as rated by their representatives, might have a greater willingness to support public decisions related to larger species within taxa. However, a conservation focus on larger species ignores the fact that most species, at least within well-studied taxa, tend not to be large, but of intermediate size (Blackburn & Gaston 1994b). Possible conservation implications of this issue might emerge when investigating the question of how well smaller species in taxa would generally profit from conservation efforts related to the larger species of the same taxa.

Although a conservation focus on the ‘featheries’ and the ‘furries’ might be challenged when it comes to achieving the target of the conservation of a broad range of organisms, there is probably no easy solution to the ‘Noah’s Ark Problem’ (Weitzmann 1998). For example, to overcome the limitations associated with the low congruence in the distributions of species from different taxa, which hinders making the ‘right’ conservation choices, one might try to create reserves based on the complementarity of areas or species
groups (e.g., Vane-Wright et al. 1991; Pressey et al. 1993; Howard et al. 1998; Balmford & Gaston 1999; Williams et al. 2006). However, as argued earlier, such approaches will also be subjective. The approaches usually also require mathematical procedures, and it is questionable whether the results of such procedures will be appealing enough to be socially and politically feasible, particularly when the selection and creation of specific reserves must compete with the aims of other societal interests.

In addition to a focus on the conservation of certain areas or species, it may therefore be necessary to strengthen general policy measures for the sake of biodiversity, that is, to reduce the force of factors that generally harm – a broad range of – species, such as habitat fragmentation. Furthermore, in all cases, public efforts to safeguard a broader range of biodiversity – other than, for example, bird or mammal species – will require the enhancement of the awareness of the existence of such species as well as of their potential assigned values.

Further research
Although this thesis, along with previous research, revealed human taxon-related preferences for species, a challenge for further research remains to investigate the specific attributes related to such preferences. For example, empirical research on the aesthetic appreciation of species and their characteristics has received very little attention.

The experimental study conducted for this thesis showed that, on average, respondents favoured relatively large species over relatively small species within the same taxon. A remaining question is to what extent people’s judgements concerning species may be influenced by manipulating, in presentations to respondents, the sizes of one and the same species and how this may vary with taxa. Conceivably, enlarging small species, for example by presenting microscopic images may to a certain extent enhance positive attitudes. Yet, constraints due to the taxonomic properties of a species will remain. For example, enlarging a ladybird is one thing, but enlarging a spider may well have the opposite effect.

More generally, the challenge for further research is to reveal more clues as to how the ‘marketing’ of biodiversity, including its majority of less-preferred species, can be enhanced. This should include exploration of the possibilities and limits of manipulation in presentations of species (see also above). This thesis showed that unobtrusive assessment may be fruitful. Furthermore, in pluralist societies, political actors such as NGOs have an important influence on conservation policy. In addition to research on people’s attitudes to species, it may be worthwhile to further explore the responses of such actors or their representatives to various species.