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REVIEWS

A Legal-Ecological Understanding of Favorable Conservation Status for Species in Europe

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Abstract

Legislation for the preservation of biodiversity has been instrumental to the recovery of multiple species and habitats. The European Habitats Directive 92/43/EEC is one of the strongest legal tools in nature conservation. This Directive seeks to achieve its biodiversity goals by requiring EU Member States to take measures to reach or maintain favorable conservation status (FCS) of natural habitats and species in Europe. FCS is a legal concept, but must be understood and applied by scientists, managers, and policy makers, and therefore a proper interpretation of this concept is crucial for biodiversity conservation and wildlife management. However, its definition contains several aspects that can lead to misinterpretation, forming the core of controversies in determining whether or not populations have reached FCS. In this review, we provide legal and ecological clarifications of the most contested aspects of FCS that have not yet been conclusively settled by analyzing and weighing a variety of sources.

Introduction

Legislation for the preservation of biodiversity during the last decades has been essential to prevent the extinction of species and habitats. The U.S. Endangered Species Act of 1973 and the European Union's Birds Directive of 1979 and Habitats Directive of 1992 are the primary legislations protecting biodiversity in the United States and Europe, respectively (Verschuuren 2004; Epstein 2013). The aforementioned directives contribute to the EU's implementation of the Bern Convention and Convention on Biological Diversity (CBD; Epstein 2013). All these legislative acts are credited with having been instrumental to the recovery of multiple species and habitats. Positive associations have been identified between certain conservation measures through the Birds Directive and the response of bird populations in Europe (Donald *et al.* 2007). The Habitats Directive can also be credited for the recovery of large carnivores in Europe's human-dominated landscapes (Chapron *et al.* 2014), although lack of enforcement remains an issue (López-Bao *et al.* 2015).

The Endangered Species Act, Birds Directive, and Habitats Directive each mandate the implementation of actions necessary to ensure the protection of habitats and species. Proper interpretation of these legislations is of fundamental importance and can have drastic consequences for conservation and management policies. However, while a substantial amount of research has focused on the definition of recovery under the Endangered Species Act (Wolf *et al.* 2015), significantly less has been written about the corresponding concept under

the Habitats Directive, with a few notable exceptions (Trouwborst 2011, 2014).

The Habitats Directive seeks to achieve its biodiversity goals by requiring EU Member States to take measures to reach or maintain the favorable conservation status (FCS) of natural habitats and species. In Article 1(i) of the Directive, the conservation status of a species is defined as "*the sum of the influences acting on the species concerned that may affect the long term distribution and abundance of its populations [within the Member States' European territory],*" and further that "*conservation status will be taken as "favourable" when: population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.*" FCS is used throughout the Directive. Article 2(2), which contains the Directive's goals, states that measures taken under the directive must be aimed at maintaining or restoring FCS of natural habitats and species. Article 16(1) allows Member States to derogate from the Directive's strict protections if doing so would not be "detrimental to the maintenance of the populations of the species concerned" at FCS. Understanding FCS is key to applying many of the Directive's provisions, including those concerning special areas of conservation (Articles 3(1) and 4(4)), requirements for surveillance (Articles 11 and 14) and reporting (Article 17), and species reintroduction (Article 22(a)). FCS for habitats is separately defined in Article 1(e). Our article addresses only FCS for species, but as one of the factors for FCS for habitats requires that the conservation status of its typical species be favorable, our conclusions are also relevant for determining FCS for habitats.

FCS is a legal concept, but must be understood and applied by scientists, managers, and policy makers. The importance of properly interpreting FCS should not be overlooked since the Habitats Directive is the pivotal instrument for biodiversity conservation in all the Member States of the European Union (Epstein 2013). However, its definition contains several aspects that can lead to misinterpretation. Member States' own interpretations of FCS may be disputed by the European Commission and trigger legal action, as has happened for the wolf *(Canis lupus)* in Sweden (Chapron 2014; Darpö 2011; Darpö & Epstein 2015).

We argue that a coherent understanding of the Directive requires a legal-ecological approach. In this review, our goal was to clarify and interpret several aspects of FCS for species, which have not yet been conclusively settled by analyzing and weighting a variety of sources. The contested aspects of the Directive we focus on are: (1) whether FCS should be measured at the species, population, or national level, (2) what it means for a species to be a "*viable component of its natural habitat,*" (3) how long is a "*long-term basis,*" (4) what it means for a species to "*maintain itself,*" (5) whether FCS should be measured from extinction or carrying capacity, and (6) whether FCS requires that a population approach historical levels. These six points have been at the core of recent controversies in determining whether or not populations have reached FCS (Laikre *et al.* 2009, 2013; Epstein 2013; Trouwborst 2014; Darpö & Epstein 2015). The methods of legal scholarship – followed in this article – are somewhat different from ecological research as the data we examine here consist of various legal sources. Importantly, the Directive itself and the decisions of the European Court of Justice (ECJ) are the only legally binding sources, while other materials are advisory or otherwise aid in interpreting legal texts.

At what level should FCS be measured?

The Directive does not directly specify at what level FCS for species should be evaluated and achieved. Based on the text of Article 1(i) of the Directive, a flourishing population is required at least at the EU, rather than the global, level: "*conservation status of a species means the sum of the influences acting on the species . . . within . . . the European territory of the Member States to which the [EU] Treaty applies.*" Member States each have a responsibility to take measures to protect those species within their European territory (i.e., excluding overseas territories of Member States) and to report on the measures taken. Article 16 of the Directive also refers to the necessity of maintaining populations of the species at FCS. The Commission requires reporting of a species conservation status for each biogeographical region within each Member State (Evans & Arvela 2011). The essential question of whether FCS should be achieved at the European, population, or Member State level has been analyzed by scholars both within the natural and legal sciences. Mehtäla & Vuorisalo (2007) propose viewing FCS as a hierarchical concept occurring at each of these levels. Guidance from the Commission has been inconsistent. As Trouwborst (2014) points out, the Commission has suggested that the question of scale is species-dependent and may require population-based analysis for some species, such as large carnivores (European Commission 2007), but has nevertheless focused only on national assessment in some situations such as the Finnish wolf case. The Large Carnivore Initiative for Europe (LCIE) guidelines support the idea that when populations are transboundary, FCS should be achieved at the population level (Linnell *et al.* 2008). However, the jurisprudence of the European Court of

Justice indicates that FCS may also be required to be achieved at the national level (Trouwborst 2014).

In the 2007 Finnish wolf case (ECJ 2007), the ECJ considered only the wolves in Finland in stating that the population was not at FCS, and not those in neighboring Russia, Sweden, or Norway. Similarly, an infringement proceeding against Sweden considered only the conservation status of the wolves in Sweden, and not those in Norway (Trouwborst 2014), although these wolves make up a single Scandinavian wolf population (Chapron *et al.* 2014). While emphasizing a population approach, Trouwborst (2014) recommends that Member States thus pursue FCS at both the national and population level. Importantly, the 2009 hamster *(Cricetus cricetus)* case (ECJ 2011) indicates that the ECJ would favor a narrow interpretation of what constitutes a population: the court considered there were multiple populations of hamsters within Alsace (France), rather than treating the French hamsters as one small part of a very large population that extends till Hungary (Weinhold 2008).

Clearly, each Member State has an individual obligation to contribute to a species FCS of those populations within or partially within their borders. The Commission has thus required the assessment and reporting of whether a species conservation status is favorable for each biogeographical region within a Member State (Evans & Arvela 2011). FCS at the European level requires thriving populations within and across the Member States. By requiring Member States to contribute to the achievement and maintenance of FCS for species within their borders and within each biogeographical region they contain, the Commission promotes consistent protection across the variety of habitat types. While for species with large ranges, it may not be possible for a Member State to be host to a population that reaches FCS entirely within its borders, each Member State has an obligation to promote FCS of the populations that exist either wholly or partly within its territory, as well as in each of its biogeographical regions, thus contributing to FCS of the species at the European level.

What does it mean for a species to be a "viable component of its natural habitat?"

One of the most contested components of FCS is what is meant by viability and which benchmarks to use to assess it. A standard method for ecologists of assessing viability is to determine minimum viable population (MVP) (Thomas 1990; Boyce 1992; Traill *et al.* 2007; Frankham *et al.* 2014; Reed & Mccoy 2014). This is the approach recommended by guidelines produced by the LCIE (Linnell *et al.* 2008), which suggest that one of several factors for determining FCS could be an MVP based on the IUCN Red List criterion E, which defines an MVP as a population with less than 10% chance of extinction within 100 years (IUCN 2001). These guidelines also discuss that FCS may require greater numbers than MVP, although it is not clear where the threshold should be.

The Commission's own guidelines promote the concept of favorable reference population (FRP) to define the prerequisite population size at which FCS is considered reached, but through a more qualitative approach by including the consideration of ecological data such as historic distribution and abundances, potential range, biogeographical and ecological conditions, gene flow or genetic variation, and add that a population should be sufficiently large to accommodate natural fluctuations and allow a healthy population structure (Evans & Arvela 2011). The 2006 Article 17 Reporting Guidelines (European Commission 2006) were the first to suggest that MVP could be linked to FCS. However, they claimed only that MVP could be "*of use*" in determining FRP and "*by definition different*." The 2011 Article 17 Reporting Guidelines again indicated that MVP is one possible means for determining FRP, adding that MVP is necessarily lower than the number required for FCS (Evans & Arvela 2011). The 2011 guidelines cited favorably a scientific article that recommended MVP be used with a criteria of extinction risk <1% over 40 generations (Traill *et al.* 2010). It should also be noted that none of the Article 17 Reporting Guidelines mention IUCN criterion E, which tolerates a much higher extinction risk (1 out of 10 populations becoming extinct over 100 years). The LCIE guidelines' recommendation to use criterion E is wholly unjustified and should be rejected; there is no reason why IUCN's criterion E should be used in determining whether a species is a "*viable component of its natural habitat*." Indeed, a textual analysis of the Habitats Directive indicates that MVP in general may not be sufficient to determine FCS. The relevant clause of the Directive does not emphasize that the species is just demographically viable as an isolated entity, but instead the role the species plays in the ecosystem of which it is a part, even though having a viable role naturally requires being first a viable entity. That a species must remain a "*component*" of its habitat implies ecological functionality in addition to demographic viability. The LCIE chose narrowly to focus on demographic viability. The language of the Directive indicates rather that ecological viability, which considers interactions among species and between a species and its habitat is the more appropriate interpretation for this particular clause. The challenge is to quantify when the strength of trophic interactions makes a species ecologically functional (Chesson & Kuang 2008).

What is a "long-term basis"?

The Habitats Directive primarily implements the Bern Convention, which in its preamble recognizes the need to preserve wild flora and fauna for future generations. But the stronger interpretive guidance stems from the preamble of the CBD, which specifically talks about the importance of biological diversity for evolution, and of preserving biological diversity for future generations. The importance of the CBD for the interpretation of the Habitats Directive is underscored by the EU biodiversity strategy to 2020, which implements the Strategic Plan for Biodiversity and Aichi Biodiversity Targets adopted under the CBD (European Parliament 2012). The EU biodiversity strategy to 2020 expresses a goal of improving the conservation status of all species and habitats through the improved implementation and enforcement of the Habitats Directive. It is not explicitly stated for how long a population must remain a viable component of its natural habitat, but in light of the goals stated in the preambles of the Habitats Directive, the Bern Convention, and the CBD, populations should remain viable indefinitely.

As the extinction probability over a long enough period is 1, this implies that to be considered at FCS, a population must maintain evolutionary potential or genetic viability (Laikre *et al.* 2009). The need for genetic viability, in addition to ecological viability, seems to be implicitly supported by the 2011 Article 17 Guidelines, which recommend Traill *et al.* (2010) to those considering using a PVA for setting FCS. Traill *et al.* (2010) concluded that long-term survival (and continued ability to evolve) of a species must aim for a metapopulation of thousands of individuals. Laikre *et al.* (2009) also argue that the long-term viability of a population requires genetic viability, requiring in turn at least a genetically effective population size of $Ne = 500$ individuals. An analysis of MVP modeled on this understanding of genetic viability was accepted by the Court of Justice in the hamster case (ECJ 2011). This case referred to an estimation of 1,500 hamsters over 600 ha as MVP, numbers derived from a study using this formulation (Kayser 2005). Recent research shows, however, that larger numbers may be necessary, as a recent exhaustive review of the role of genetic factors in population viability found that to avoid eroding evolutionary potential, $Ne = 1{,}000$ would instead be warranted (Frankham *et al.* 2014). While each Member State must reach and maintain FCS, however, it may not be possible for each Member State to have over $Ne = 500$ or 1,000 individuals of every listed species in the different Annexes of the Directive. Instead, Laikre *et al.* (2009) argue that species populations within states can maintain the necessary genetic variation to remain viable if they are part of a larger population or network of connected populations that has the requisite numbers and with connectivity between patches of at least one genetically effective immigrant each generation to maintain sufficient genetic diversity. These numbers of genetically effective immigrants necessary are likely to be higher if the concerned population already suffers from a restricted genetic diversity.

What does it mean for a species to "maintain itself"?

Another contested aspect of the definition of FCS is whether the use of the reflexive "*itself*" indicates or not that species must remain viable without any human intervention. First, it is important to note that an equivalent of the word "*itself*" does not occur in the majority of the other official language versions of the Habitats Directive. All language versions of EU legislation are equally valid (ECJ 1998). The French version, for example, requires that the species "*continue et est susceptible de continuer . . . à constituer*," which more literally means that the species must "*continue and be likely to continue to constitute*." The Bonn Convention (or Convention on Migratory Species of 1979), which is the source of the concept of FCS, uses also the reflexive phrase "*maintaining itself*" in its English version. However, several other language versions of the Bonn Convention do not use such reflexive. It is therefore unclear from a textual interpretation whether populations must be viable without continued management measures. Where there are differences in the language versions of a law, the court must find a uniform interpretation by interpreting the contested passage "*by reference to the purpose and general scheme of the rules of which it forms a part*" (ECJ 1977). Further clarifications can therefore be provided by looking at what, if any, level of human management is deemed consistent with the purpose of the Habitats Directive.

The Directive acknowledges that much of Europe's habitat cannot be truly said to be natural: the definition of natural habitat in Article 1(b) includes both the "*entirely natural*" and "*semi-natural*." In fact, human activity, such as certain agriculture or livestock practices, may be required to maintain habitats of community interest (Bignal & McCracken 2000; López-Bao *et al.* 2013) and are necessary to reach FCS for certain species as the Directive's preamble states that maintaining biodiversity may "*in certain cases require the maintenance, or indeed the encouragement, of human activities*." For example, in the Alsace hamster case (ECJ 2011), hamster conservation status was unfavorable due in part to changing agricultural practices—hamsters require the cultivation of particular types of cereals and hay, but changes in the agricultural

market had led to these crops being replaced. The ECJ ruled that it was necessary for the management plan for the hamster to include the cultivation of crops needed to support the continued existence and recovery of the hamster. The court considered that while the hamster is not at FCS, the attainment and maintenance of its FCS would necessarily require agricultural activity.

It does not, however, logically follow that FCS of a species could be considered to be maintained if its continued existence was wholly dependent on human intervention as this is also not in line with the purpose of the text. For example, a metapopulation dependent on regular artificial translocations should not be considered to have reached FCS, as such dependence would likely not be consistent with the Directive's goal. The goal of the Habitats Directive is to conserve species in their natural habitats within a "*coherent European ecological network*" as part of a functioning ecosystem. While habitats need not be "*entirely natural*" for species, which makes sense in a human-dominated European landscapes, and some human management help is tolerated or even necessary (Robinson *et al.* 2001; Donald *et al.* 2002), at some point of human intervention a species may not be considered to be in a natural habitat at all, though it is not yet clear how much human management activity should be tolerated. While it is not literally required that a species maintain "*itself*," the fact that several language versions have expressed the clause in question using the reflective "*itself*" support the interpretation that the intention was that the amount of human assistance required should be limited.

Should FCS be measured from extinction or carrying capacity?

The Commission guidance documents consistently emphasize that FCS must be assessed as "*distance from some favourable state*" rather than distance from extinction (Evans & Arvela 2011). Therefore, conceptually, measurement from carrying capacity appears to be a better fit. That is, if conservation status is evaluated based on the distance from favorability, but the FRP value is based on distance from extinction, the conservation status is indirectly being measured from extinction. It is more logically consistent to base the FCS on an even more favorable state which is carrying capacity. The European Commission notes positively the use of carrying capacity to determine the FRP values and describes in detail how this has been done in Poland for wolves (Evans & Arvela 2011; based on the suitable habitat for the species, Jędrzejewski *et al.* 2008).

Does FCS require that a population approaches historical levels?

The preparatory materials for the Habitats Directive support the idea that there was no requirement to increase a species population toward historical levels (whatever its definition is). The European Commission proposed its first version of the Habitats Directive in 1988, in which the concept of FCS was not included. Instead, Member States were directed to "*maintain the abundance and diversity of wild fauna and flora at a level which corresponds in particular to ecological, scientific and cultural requirements and the needs of sub-species, varieties, forms and populations at risk locally, while taking account of economic and recreational requirements*" (European Commission 1988). Provisions related to derogation were similar to those in the current Article 16: derogation from provisions protecting "*threatened*" species could only be granted in certain situations if there was no other satisfactory solution, and the exception would not be detrimental to the maintenance of "*satisfactory levels*" (rather than FCS) of the population concerned. The term "*satisfactory level*" was used throughout the proposal, but never defined. Both of these provisions were based on the corresponding provisions in the Birds Directive. These vague requirements were objected to by committees of the European Parliament which made suggestions to use the concept of FCS based on that in the Bonn Convention (Committee on the Environment, Public Health and Consumer Protection 1990; Economic and Social Committee 1990), which includes the three criteria currently used in the Habitats Directive plus a fourth: "*the distribution and abundance of the migratory species approach historic coverage and levels to the extent that potentially suitable ecosystems exist and to the extent consistent with wise wildlife management*" (Bonn Convention 1979). The Committee on the Environment, Public Health and Consumer Protection recommended using all four Bonn Convention criteria, while the Economic and Social Committee recommended using only the first three.

In February 1991, the European Commission put forward a modified proposal incorporating elements of many of the European Parliament amendments (European Commission 1991). It utilized the concept of FCS and based its definition on the first three elements provided in the Bonn Convention rather than all four (European Commission 1991) without explaining this decision. The final language of the Habitats Directive reflects therefore the Commission's recommendation to use these first three elements. The fact that language was considered but not used in the final version of the law does not necessarily mean that it was rejected. However, there does not seem to be any indication that the historical

population factor was intended to be preserved in the final text of the Directive. Although the use of historical distribution and potential range in determining FCS is recommended by both the 2006 and 2011 Article 17 Reporting Guidelines, it would seem to be a good management practice but not legally required that species populations approach historical levels and utilize potential habitat. Be that as it may, for species not at FCS continued improvement in status is always required (Schoukens 2014). Some species protected by the Habitats Directive are also protected by the Bonn Convention, and Member States should take care to utilize the Bonn Convention's definition of FCS when discharging obligations stemming from agreements made under the Convention's framework.

Conclusions

Our analysis provides legal and ecological clarifications of the most contested aspects of FCS, a pivotal concept of the EU Habitats Directive. The Habitats Directive is one of the many international legal instruments (Ramsar Wetlands Convention, World Heritage Convention, Convention on Trade in Endangered Species, Convention on Migratory Species, Convention on Biological Diversity) pertaining to the protection of habitats and species, and a cornerstone of the EU's implementation of its international obligations for species protection. Because the Directive is a legal act of the European Union whose implementation by Member States is subject to legal scrutiny by the ECJ, its benefits from a growing body of judicial clarification that other treaties do not. Understanding the goals and obligations from the Habitats Directive can show how some of the obligations from other international treaties have been interpreted in one very large jurisdiction and may therefore help interpret aspects of these other legal instruments, for example, the Bonn Convention, which uses a somewhat different formulation of FCS. Our analysis is directly relevant for interpreting the Birds Directive. While, as discussed above, the Birds Directive uses far less precise terms than FCS, Commission guidance to interpreting that directive has stated that "the principles underpinning [FCS] are equally applicable in relation to the objective of [the Birds Directive]" (European Commission 2008).

We have argued for how several contested aspects of FCS should be construed. According to our analysis, Member States have an individual obligation to promote FCS of those populations within or partially within their borders, as well as in each of its biogeographical regions, thus contributing to FCS of the species at the European level. The language of the Directive suggests ecological viability in addition to demographic viability for species. We argue that it is also necessary that the species have evolutionary or genetic viability in addition to ecological viability. The contextualization of ecological viability in Europe remains an issue. It is not explicitly stated for how long a population must remain a viable component of its natural habitat, but in light of the goals stated in the preambles of the Habitats Directive, the Bern Convention, and the Convention on Biological Diversity, populations should remain viable indefinitely. A species may be considered to be at FCS even if some form of human management is required, but the species must be able to be said to be part of a functioning ecosystem. This means that the need for human management must be limited. On the other hand, where a species is dependent on some sort of human activity to maintain its habitat, it may be necessary to continue that activity. The Directive seems to support but not currently require that populations continue to increase toward historical levels or carrying capacity. We also find that it is also more logically consistent to measure FCS from carrying capacity than from extinction.

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