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CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE  
AND NATURAL HABITATS

**Standing Committee**

41<sup>st</sup> meeting  
Strasbourg, 30 November - 3 December 2021

**REPORT ON  
ALIEN PATHOGENS AND PATHOGENS SPREAD BY  
INVASIVE ALIEN SPECIES IN EUROPE**

**DISCUSSION PAPER**

**For discussion by the Group of Experts on IAS at their 14<sup>th</sup> meeting,  
6 July 2021**

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*(Views expressed independently, and not on behalf of the Council of Europe or the Secretariat of the Bern Convention)*

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**Second Draft of the study on alien pathogens and pathogens spread by Invasive Alien Species (IAS) in Europe.  
Comments and suggestions flagged by contracting parties and experts for discussion**

The suggested edits have been classified as follows:

Green: accepted edits

Amber: pending edits to be discussed with the Group of Experts.

Red: edits which are recommended not to be accepted as they would go beyond the intended scope of the study or for other reasons.

The discussion at the Group of Experts' meeting will focus on those suggested edits marked in amber and in red. Due to time constraints, edits marked in green will only be discussed if requested by members of the Group of Experts.

Contracting Party/Expert	Paragraph	#	Comment/question	Expert's response
Swedish Environmental Protection Agency	Page 3 § 1 – Summary  <i>'Invasive alien species (IAS) and emerging infectious diseases (EIDs ) are known to [...]'</i>	1	For clarity, please include definitions of these two terms	<i>The terms are defined in chapter 2 rational and definitions.</i>
Federal Ministry for the Environment, Nature - Germany -	Page 3 § 1- Summary  <i>'Invasive alien species (IAS) and emerging infectious diseases (EIDs) are known to interact as key drivers of biodiversity loss, encompassing species extinction and ecosystem change'</i>	2	Consistent use of pathogen is proposed, in the text different terms are used : Pathogen, disease, parasite	<i>This reflects the use of the different terms in the different fields/documents (e.g. Conventions).</i>

Federal Ministry for the Environment, Nature - Germany	Page 3 § 2- Rationale and key definitions	3	We think that this chapter needs some revision, so that everybody can understand the terms. Definition of central terms like alien pathogens and pathogens spread by IAS , wildlife, livestock, ... should be added and their relationships to the terms IAS and EIDs have to be illustrated. It should be clearly shown, that the terms are used ambiguous, which is a problem of common communication.	<p><i>Terms such as IAS, IAS pathogens, and wildlife are introduced.</i></p> <p><i>As acknowledged in chapter 3 of the study, 'There are also a number of pending issues which would certainly require further investigations, including on overall scope and definitions, as well as regarding the actual relevance of topics and problems discussed.'</i></p> <p><i>Please be aware that, this is something that was already foreseen in the document as a follow up action (see recommendation #7.2).</i></p>
Swedish Environmental Protection Agency		4	It would be very helpful to include a list of terms and definitions.	As above
Swedish Environmental Protection Agency		5	The text would generally benefit if terms used, such as pests, diseases and pathogens, is used in a more consistent and stringent way. In the area of Plant health, 'disease' is often included in the term plant pest. Since this is not obvious for the general public we propose the use 'pest and diseases'. We note that 'animal disease' is frequently used, please consider to use plant pest and diseases, where relevant	<p><i>The author would avoid using the word pest except than in definitions about the scope of the IPPC and EPPO, or wherever this is formally used. It is the author's opinion that the word "pest" may lead to some misunderstanding as the document deal with wildlife in general, and in common language there are also some vertebrates which may be considered pests, like rats, foxes, etc.</i></p> <p><i>While Emerging infectious diseases have been defined in chapter 2, diseases as such have not been defined in the present version of the study.</i></p> <p><i>The author suggests adding a footnote in chapter 2 explaining why certain definitions are not part of the study. A further suggestion could be to establish a working group whose task could be to agree on common definitions to be used for future work under the Bern Convention.</i></p>
Swedish Environmental Protection Agency	Page 6 § 5.1 - The Bern Convention	6	Suggestion to include the words " and pests". So, the sentence would be as follows: ' <i>The European Strategy on IAS includes a few explicit references to diseases <b>and pests</b>, particularly in relation to the need to prevent disease incursions at source, and on arrival, through border control and quarantine measures.</i> '	See comment above

Swedish Environmental Protection Agency	<p>Page 10 § 5.7 - The European and Mediterranean Plant Protection Organization</p> <p><i>'Furthermore, EPPO advises member Governments on the technical, administrative and legislative measures necessary to prevent the introduction and spread of pests and diseases of plants and plant products'</i></p>	7	Note the vocabulary, here diseases are mentioned explicitly.	As above
Swedish Environmental Protection Agency	<p>Page 10 § 5.6 - The International Plant Protection Convention</p> <p><i>'The IPPC extends beyond the protection of cultivated plants to the protection of natural flora and plant products. It takes into consideration both direct and indirect damage by pests.'</i></p>	8	<ol style="list-style-type: none"> <li>1. The IPPC takes into consideration damage by pests, including plant pathogens. To be clear, use the term 'plant pests and diseases'.</li> <li>2. Could be worth for clarity to also include perhaps in a footnote, the definition of 'pest' as it appears in ISPM 5: Any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products. Note: In the IPPC, "plant pest" is sometimes used for the term "pest"</li> </ol>	As above.
Federal Ministry for the Environment, Nature - Germany	<p>Page 3 § 2 - Rationale and key definitions</p> <p><i>'Those alien species that cause negative effects on</i></p>	9	Seems not consistent with the definition in CBD	<i>According to Decision VI/23: invasive alien species" means an alien species whose introduction and/or spread threaten biological diversity. The sense was broadened taking into account other sources, e.g. the EU IAS regulation</i>

	<i>biodiversity, society or the economy are termed invasive alien species (IAS).'</i>			
Ministerio para la Transición Ecológica y el Reto Demográfico - Spain	Page 3 § 2- Rationale and key definitions	10	Suggestion to include the words "can potentially", as not all species show direct and fast negative effects. So, the sentence would be as follows: " <i>Those alien species <b>that can potentially</b> cause negative effects on biodiversity...</i> "	<i>If an alien species does not show an impact, then it is not invasive by definition.</i>
Ministry of the Environment of the Czech Republic	Page 3 § 2- Rationale and key definitions	11	Suggestion to add the words " <i>such as recent Covid-19 outbreak</i> " in the sentence below: <i>"Introduction of alien species with a risk of carrying pathogens and their biological invasions may therefore contribute substantially to the spread of emerging infectious diseases (EIDs), which represent a major threat not only to humans (such as recent Covid-19 outbreak), but also to biodiversity and ecosystem services."</i>	<i>The risk of zoonosis can be mentioned, but its analysis would go beyond the scope of the document, which is to focus on wildlife disease and not on zoonosis. The author suggests adding an explicit statement in chapter 3, regarding the fact that zoonosis are not covered by this document.</i>
Swedish Environmental Protection Agency		12	Although the report focuses on impacts of IAS pathogens on wildlife, it would be timely to include a sentence or two on the risks of IAS contributing to the chain of events that may lead to zoonosis and threats to human health.	<i>As above.</i>
Swedish Environmental Protection Agency	Page 4 § 4 - Alien pathogens and pathogens spread by IAS, an overview	13	Suggestion to add the following at the end of the first paragraph, <i>'Alien species can also contribute to the creation of zoonosis, that is an animal disease that may spread to humans, by acting as a novel vector of an endemic pathogen. Several invasive alien mosquito species has established and spread in Europe over the last decades. In the wake of their establishment we see outbreaks of EIDs like chikungunya, dengue and zika virus (Gossner et al 2018).'</i>  * Gossner, C., Ducheyne, E. Schaffner, F. 2018. Increased risk for autochthonous vector-borne infections transmitted by Aedes albopictus in continental Europe. Eurosurveillance 23(24)	<i>As above.</i>

European Commission - DG Environment	Page 6 § 5 - Policy and legislation framework, an overview  <i>'The objective of this section is to provide a brief summary [...] of a selection of the more pertinent policy and legislation tools, including at the European and EU level.'</i>	14	The document has a very strong EU angle. It would be useful if it was complemented with references to relevant legislation of non-EU Contracting Parties to the Bern Convention and wider, e.g. USA, New Zealand, Australia, Japan, China etc. There should be lessons to be learned from them	<i>It worth noting that carrying out a more comprehensive legislation assessment would go beyond the initial mandate of the Group of Experts  It would certainly be useful to widen the policy and legislation analysis to comprehend Bern Convention member states which are not members of the EU, which could be added as annex to this study. Please be aware that this is something that was already foreseen in the document as a follow up action (see recommendation #7.6).</i>
European Commission - DG Environment	Page 11 § 5.8 - The EU Regulation No. 1143/2014 on Invasive Alien Species	15	Article 13 has direct effect only if an organism is included in the Union list . Suggestion to modify  <i>'In this way alien pathogens and pathogens spread by IAS are likely to be addressed too.'</i>  With  <i>'In this way alien pathogens and pathogens spread by IAS could be addressed too, though only indirectly.'</i>  Or delete the entire paragraph from <i>'The EU regulation [...]</i>	<i>The third draft of the study will be amended accordingly.</i>
Federal Ministry for the Environment, Nature - Germany	Page 10 § 5.8 - The EU Regulation No. 1143/2014 on Invasive Alien Species	16	on the presentation of the contents of Regulation (EU) No 1143/2014, the statement in the last paragraph on the action plan and the priority paths <i>"In this way alien pathogens and pathogens spread by IAS are likely to be addressed too"</i> should be deleted. In accordance with Art. 13 para. 1 EU Regulation, only alien species that are included in the list of invasive species of EU-wide importance are to be taken directly into account when prioritising the paths. Currently, no pathogens are included on the list and will not be included in the future either, as correctly stated in the previous paragraphs of the study. Of course, it cannot be ruled out that the measures to be developed for the priority pathways will at least indirectly take pathogens into account. However, this depends on the individual case.	See changes suggested by the EC above.
Environment & Resources Authority- Malta	§ 5.8 - The EU Regulation No. 1143/2014 on Invasive Alien Species	17	Clarification is being requested as to why Regulation 1143/2014 is listed in the "Policy and legal framework" section, as this Regulation does not deal with pathogens directly.	<i>Regulation 1143/2014 is listed in the "Policy and legal framework" section as it addresses pathogens indirectly through risk assessments of IAS.</i>

Ministry of the Environment of the Czech Republic	Page 15 § 6.1 - Priority research areas  <i>"However, communication between scientists, managers and policy makers from different fields is often complicated by different perspectives and terminologies (Jeschke et al. 2013, Lymbery et al. 2014)."</i>	18	We suggest deleting or rephrasing the sentence. According to our experience, relevant stakeholders are aware of the seriousness of the problem and do cooperate and exchange information. The main issue is finding suitable solutions.	<i>The intention of the author was to refer to communication challenges, not to lack of awareness or cooperation. Lack of a common terminology is the main issue that, in the author perspective, causes communication difficulties between scientists, managers and policy makers.</i>
European Commission - DG Environment	Page 15 § 6.2 - Gaps in policy and legislation, including EU one	19	The text has a very narrow EU scope. The document could benefit from wider examples before it is considered final. Then it would be possible to compare EU and other experiences. Only then could one conclude on whether indeed the EU legislation has gaps and/or whether better policy exists that EU can learn from	<i>As above. The author suggests mandating a separate study to carry out a more comprehensive legislation assessment.</i>
Ministry of the Environment of the Czech Republic	Page 15 § 6.3 - Management implications	20	The study presents the case of amphibian chytridiomycosis, whereas other relevant diseases are not mentioned (for example Crayfish plague or diseases affecting plants). Thus, the study would merit further elaboration in this regard in order to be comprehensive.	<i>It is the author's opinion that the topic of pathogens affecting humans and livestock is already sufficiently covered, so this study should keep its focus on wildlife only.  In general, adding examples on pathogens affecting wildlife would not change the outcomes of the document, and would not necessarily help to clarify or simplify such a complex issue. In fact, adding cases studies could open further comments on the choice of examples, representativeness of taxonomic groups and representativeness of mechanisms of spread/impact of pathogens  The case of the fungus Batrachochytrium salamandrivorans (Bsal) has been chosen among the others because the Bern Convention adopted a specific recommendation on the issue which led to some follow up by the EU, so it was useful to illustrate the limits and potentialities of current legislation</i>

Swedish Environmental Protection Agency	§ 5.1 - The Bern Convention § 5.9 - The EU Animal Health policy and legislation	21	<p>This report provides an excellent basis for initiating a process to deal with IAS that are pathogens in themselves or are carriers of pathogens. It is however very theoretical and would benefit from including examples of alien pathogens that have already harmed biological diversity, as well as caused damage to socioeconomic values. This is important to give perspective to the orders of magnitude of harm that alien pathogens have had and will have in the future, in order to convince decision makers of the wisdom of investing in such a program. One could easily insert a paragraph or a text box referring to the crayfish plague <i>Aphanomyces astaci</i> which in just 100 years has decimated the noble crayfish to the point of local extinctions, and lead to the introduction and spread of invasive alien crayfish over all of Europe.</p> <p>The spread of the chytrid fungus and its devastating impact on amphibians is an excellent illustration of the driving motive for initiating this work and would clearly illustrate the need for a program on alien pathogens that will simulate cooperation between animal health and biologists including IAS experts.</p>	As above.
Federal Ministry for the Environment, Nature - Germany	Page 4 § 3- Scope and aim	22	Scopes and aims in connection with EIDs are not mentioned. Examples of alien pathogens affecting native wildlife are coming exclusively out of the herpetofauna. This suggest a very partial impression. Maybe it would be benefiting to add examples out of other taxonomic groups, like e.g. birds ( <i>Turdus merula</i> and the Usutu-virus).	As above.
Département fédéral de l'environnement, des transports, de l'énergie et de la communication DETEC - Switzerland		23	Switzerland things that the document would have profited from mentioning more case studies than just the example of the salamander fungus. Further well known examples are e.g. crayfish plague ( <a href="https://www.cabi.org/isc/datasheet/87335">https://www.cabi.org/isc/datasheet/87335</a> ), squirrel parapoxvirus ( <i>Ecology Letters</i> Volume 6, Issue 3, March 2003, Pages 189-196) or ladybird microsporidia ( <i>Science</i> 17 May 2013: Vol. 340, Issue 6134, pp. 862-863).	As above.
Département fédéral de l'environnement,		24	With regard to the recommendations provided in chapter 7 it might be appropriate to broaden the scope to more than just one	As above.



des transports, de l'énergie et de la communication DETEC - Switzerland			example (salamander fungus) and analysing primarily the shortcomings in practice based on the existing examples.	
Swedish Environmental Protection Agency	§ 5 - Policy and legislation framework, an overview	25	We would also like to have further clarified how the work on plant pathogens carried out by the Bern Convention, links to the work and responsibilities that falls under the International Plant Protection Convention. This, in order to avoid duplicate work and instead stimulate cooperation between the Conventions in the area of protecting biodiversity. This means that we support the ambition in this document to 'allow biological invasion experts to liaise more closely to animal and plant health experts'.	<i>It worth noting that carrying out a more comprehensive legislation assessment would go beyond the initial mandate of the Group of Experts This is an important point for future follow up.</i>
Swedish Environmental Protection Agency	Page 9 § 5.6 - The International Plant Protection Convention	26	Suggestion to modify the sentence below as follows (additions in bold): <i>'The IPPC is recognized by WTO as the international standard setting body for plant health, under the SPS Agreement. <del>Its aim</del> <b>The aim of the IPPC</b> is to secure coordinated, effective action to prevent and to control the introduction and spread of pests <b>and diseases</b> of plants and plant products (pest is a broad enough term that covers also IAS threatening plants in the wild environment).'</i>  Additional note: It is IPPC that covers also IAS threatening plants in the wild environment, not the term 'pest' as such.	<i>This is an official definition from the IPPC website <a href="https://www.ippc.int/en/structure/">https://www.ippc.int/en/structure/</a> and therefore shouldn't be changed. In the third draft of the study, the author will add a footnote to clarify that the text uses the IPCC definition.</i>
Federal Ministry for the Environment, Nature - Germany	Page 10 § 5.7 - The European and Mediterranean Plant Protection Organization	27	Suggestion to delete the word "products", so the text would read as follows:  3. <i>'EPPO has produced and adopted a large number of Standards in the areas of plant protection <del>products</del> and plant quarantine, including Standards on Pest Risk Assessment, Pest Risk Management and on Environmental Risks of Biocontrol Agents.'</i>	Text excerpted from <a href="https://www.eppo.int">https://www.eppo.int</a>

Swedish Environmental Protection Agency	Page 10 § 5.8  <i>'The transmission of diseases is recognized as a threat posed by IAS to biodiversity and related ecosystem services, and as such is taken into account in the risk assessments'</i>	28	The transmission of Pathogens?	<i>"transmission of diseases" is the term used in the Regulation and therefore shouldn't be changed.</i>
Federal Ministry for the Environment, Nature - Germany	Page 10 § 5.8- The EU Regulation No. 1143/2014 on Invasive Alien Species	29	Suggestion to amend the text as follows (additions in bold):  <i>'This is because the IAS Regulation recognises that there are currently over 40 Union legislative acts on animal health <b>and on plant health</b> which include provisions on animal diseases <b>or plant pest respectively.</b>'</i>	<i>The proposed change does not reflect the text of the Regulation.</i>
Swedish Environmental Protection Agency	Page 11 § 5.8 - The EU Regulation No. 1143/2014 on Invasive Alien Species	30	Suggestion to change the words " in fact" with "The interpretation of the EU IAS Committee is that". So, the sentence would be as follows: <i>"The interpretation of the EU IAS Committee is that according to art. 2, this Regulation does not apply to [...]".</i>	<i>The proposed change does not reflect the text of the Regulation.</i>
Ministry of the Environment of the Czech Republic	Page 3 § 1- Summary	31	The study refers to CBD, its current Strategic Plan for Biodiversity 2011-2020 and the Aichi Targets. However, these will soon be outdated as new global biodiversity framework is being developed and will be adopted at the next CBD COP. We suggest to reflect these developments in the text (being aware at the same time that no specific information on the future framework is available at this point).	<i>This would be valid for many points in the document, in fact there will be a few more changes, e.g. in the EU animal and plant health legislation (not to consider any points in the literature). It must be noted that legislation and policy documents are reviewed regularly, an effort to map the current policy and legislation framework could be soon be out-of-date.  <i>The author's suggestion is to keep the document as it is, coherently with the draft date of 2019.</i></i>
Federal Ministry for the Environment, Nature - Germany	Page 12 § 5.10 - The EU Plant Health Law	32	This chapter needs an update, see also EU website	<i>As above</i>

Federal Ministry for the Environment, Nature - Germany	Page 12 § 5.10 - The EU Plant Health Law	33	Suggestion to amend the text as follows (additions in bold): <i>'The core of the EU policy and legislation in relation to plant health is <b>Regulation (EU) 2016/2031 of the European Parliament and of the Council concerning protective measures against pests of plants</b> <del>Council Directive 2000/29/EC</del>, as amended. The general principles of this <del>directive</del> regulation are based upon provisions laid down by the IPPC.'</i>	As above
Federal Ministry for the Environment, Nature - Germany	Page 12 § 5.10 - The EU Plant Health Law	34	Suggestion to delete the following sentence: <i>'Directive 2000/29/EC, as last amended by Implementing Directive (EU) 2019/523, will be mainly repealed on 14 December 2019 and will be replaced by Regulation (EU) 2016/2031 of the European Parliament and of the Council concerning protective measures against pests of plants.'</i>	As above
Swedish Environmental Protection Agency	Page 11 § 5.8 - The EU Regulation No. 1143/2014 on Invasive Alien Species  <i>'The interpretation of the EU IAS Committee is that according to art. 2, this Regulation does not apply to [...] harmful organisms listed in Annex I or Annex II to Directive 2000/29/EC, and harmful organisms for which measures have been adopted in accordance with Article 16(3) of that Directive.'</i>	35	Please update to the current wording, which refer to 2016/2031 that is the new EU regulation in force since 14 December 2019 and that has replaced Directive 2000/29  <i>'pests of plants listed pursuant to Article 5(2) or Article 32(3), or subject to measures pursuant to Article 30(1), of Regulation (EU) 2016/2031 of the European Parliament and of the Council'</i>	As above
Swedish Environmental Protection Agency	Page 11 § 5.9 - The EU Animal Health policy and legislation	36	Regulation (EU) 2016/429 repeals Council Directive 2006/88/EC from 21 April 2021.	As above.

	<i>'The animal health conditions governing the placing on the market of aquaculture animals and products are defined in Council Directive 2006/88/EC. [...]'</i>			
Swedish Environmental Protection Agency	Page 12 § 5.9- The EU Animal Health policy and legislation  <i>'For example, there is some legislation aimed at governing the organization of veterinary checks on animals entering the EC, like Council Directive 97/78/EC and Council Directive 91/496/EEC'</i>	37	Both directives are no longer valid, they are since 14th December 2019 repealed and replaced by regulation 2017/625	<i>As above.</i>
Swedish Environmental Protection Agency	Page 12 § 5.10 - The EU Plant Health Law	38	This section needs to be updated since we now have passed the date 14 December 2019 which means that Council Directive 2000/29/EC is replaced by Regulation (EU) 2016/2031.	<i>As above.</i>
Federal Ministry for the Environment, Nature - Germany	Page 10 § 5.7 - The European and Mediterranean Plant Protection Organization	39	Suggestion to amend the text as follows (additions in bold): The European and Mediterranean Plant Protection Organization <sup>1</sup> (EPPO) <b>has 52 member countries and</b> is a RPPO <b>recognized</b> within the framework of the IPPC. <b>EPPO</b> <del>which</del> <b>develops, among other tasks, also</b> regional phytosanitary measures, including a dedicated work programme and expert panel for invasive alien plants.	<i>The number of parties indicated in the document will be coherent with the drafting date of 2019.</i>

<sup>1</sup> <https://www.eppo.int>

Federal Ministry for the Environment, Nature - Germany	<p>Page 11 § 5.9 - The EU Animal Health policy and legislation</p> <p><i>'The EU regulation on IAS includes some innovative pathways-related provisions, such as the provisions of art. 13, according to which Member States are required to adopt and implement action plans to address priority pathways (see on this regard the document made by the Bern Convention on Guidance for governments concerning IAS pathways action plan ). In this way alien pathogens and pathogens spread by IAS are likely to be addressed too.'</i></p>	40	Pathways are also addressed in plant health	<i>Chapter 5, paragraph 9 focuses on EU regulation. Chapter 5, paragraph 6, which focuses on the International plan Protection convention, mentions that that vectors are addressed too.</i>
Federal Ministry for the Environment, Nature - Germany	<p>Page 13 § 6 - Main gaps or constraints</p>	41	A differentiated description for the different areas is needed, see pest risk analyses in plant health	<i>Please be aware that this is something that was already foreseen in the document as a follow up action (see recommendation #7.2).</i>
European Commission - DG Environment	<p>Page 15 § 6.2 - Gaps in policy and legislation, including EU one</p>	42	<p>Suggestion to modify the sentence below as follows (additions in bold):</p> <p><i>'The <del>uncoordinated and extemporary</del> nature of the response, if any, to EIDs in wildlife, is a clear consequence of these <b>apparent policy and legislation gaps</b> (Roy et al. 2017). The issue is <del>well</del> illustrated by the case of the Bsal, <b>Roy et al. 2017</b></i></p>	<i>The suggested amendments would modify the meaning of the sentence and the intention of the author.</i>

			<b><i>consider the EU response to Bsal to be of “uncoordinated and extemporary nature. However, there were several responses to Bsal. For example, the Bern Convention recently approved recommendation No. 176 (2015)’</i></b>	
Ministerio para la Transición Ecológica y el Reto Demográfico - Spain	Page 19 § 7.8 - Identification of key management tools	43	Suggestion to include a new sentence after "...disease spread (Crowl et al. 2008)" to propose the need of a review of the information from citizen science projects. Hence, we would consider appropriate to include <b>‘However, these new records and reports from citizen science should be carefully reviewed.’</b>	<i>There would be a lot to say in relation to Citizen Science. The suggested amendments can be included in the third draft of the study, although it would go beyond the initial scope of the document to deepen the analysis of this topic.</i>
Federal Ministry for the Environment, Nature - Germany	Page 19 § 7.8- Identification of key management tools	44	<p>Identification of key management tools; Citizen Science: As some of the invasive species are associated with human health issues such as causing allergies or transporting pathogens (mosquitoes), we strongly recommend to include one sentence here on the ethical and legal considerations when engaging members of the public in the collection of data about invasive species.</p> <p>See two publication that address this issue  Rasmussen, L.M. and Cooper, C., 2019. Citizen Science Ethics. <i>Citizen Science: Theory and Practice</i>, 4(1), p.5. DOI: <a href="http://doi.org/10.5334/cstp.235">http://doi.org/10.5334/cstp.235</a>  Resnik, David B., Kevin C. Elliott, and Aubrey K. Miller. "A framework for addressing ethical issues in citizen science." <i>Environmental Science &amp; Policy</i> 54 (2015): 475-481.</p>	<i>As above.</i>
Département fédéral de l'environnement, des transports, de l'énergie et de la communication DETEC - Switzerland		45	Considering the varying action with regard to these well-known examples, it is questionable to what degree the "10 key areas identified for research and action" described in chapter 6.1 would make a difference. These examples illustrate that in practice, there might exist other limitations of greater importance than those emphasized in the "gaps in knowledge, science, policy and legislation regarding alien pathogens and pathogens spread by IAS affecting wildlife" (cf. chapter 6.3).	<i>It is not clear to the author how Switzerland suggests improving the study. To be discussed at the group of experts' meeting.</i>

Federal Ministry for the Environment, Nature - Germany	Page 3 § 1 - Summary	46	<p>In our view, the study appears to be conclusive and coherent. The identification of research needs and recommendations for action is understandable.</p> <p>The authors state in their first sentence of the summary that “Invasive alien species (IAS) and emerging infectious diseases (EIDs) are known to interact as key drivers of biodiversity loss....” However, we question whether there is really enough scientific evidence to support this statement?</p>	<p><i>The document tried to provide such evidence. The author suggests rephrasing as “Invasive alien species (IAS) and emerging infectious diseases (EIDs) are known to interact <b>with native wildlife</b> as key drivers of biodiversity loss, encompassing species extinction and ecosystem change.”</i></p>
Federal Ministry for the Environment, Nature - Germany	Page 3 § 1 - Summary	47	<p>Suggestion to change the word " integration" with “cooperation”. So, the sentence would be as follows: <i>“However, the two disciplines of IAS and EIDs are still lacking the required level of <b>cooperation</b>”.</i></p>	<p><i>Suggestion to include both words, integration and cooperation</i></p>
Federal Ministry for the Environment, Nature - Germany	Page 3 § 1- Summary  <i>‘Despite the current progress in science and policy in both fields, there are a number of knowledge and policy gaps’</i>	48	<p>Differentiate the gaps and give examples for different areas</p>	<p><i>The summary is merely an introduction to the study. Gaps are discussed in chapter 6, which will be referenced in chapter 2 of the third draft of the study.</i></p>
Swedish Environmental Protection Agency	Page 3 § 1 - Summary	49	<p>Suggestion to include the words " and their impacts on biodiversity, in particular on wild animals " to clarify the aim of this report at an early stage. So, the sentence would be as follows: " ...] <i>with an overview of the issues at stake in relation to alien pathogens and pathogens spread by IAS <b>and their impacts on biodiversity, in particular on wild animals</b>, as defined above.</i></p>	<p><i>The third draft of the study will be amended accordingly.</i></p>
Swedish Environmental Protection Agency	Page 3 § 2 - Rationale and key definitions	50	<p>Suggestion to modify: <i>‘Introduction of alien species with a risk of carrying pathogens and their biological invasions may therefore contribute [...]’</i> With</p>	<p><i>The third draft of the study will be amended accordingly.</i></p>

			<i>'Biological invasions of alien species that may in themselves cause disease or may be vectors for transmitting pathogens contribute[...]</i>	
Swedish Environmental Protection Agency	Page 3 § 2 - Rationale and key definitions	51	Suggestion to include the word "also". So, the sentence would be as follows: <i>" In this sense, EIDs may <b>also</b> affect livestock and crops, and ultimately [...]</i>	<i>The third draft of the study will be amended accordingly.</i>
Swedish Environmental Protection Agency	Page 4 § 3 - Scope and aim	52	Suggestion to include the words " harmful for biodiversity". So, the sentence would be as follows: <i>' The aim of this document is to provide Contracting Parties to the Bern Convention of the Council of Europe (CoE), namely their governments and national authorities, with an overview of the issues at stake in relation to alien pathogens and pathogens spread by IAS <b>harmful for biodiversity.</b></i>	<i>The third draft of the study will be amended accordingly.</i>
Swedish Environmental Protection Agency	Page 4 § 2 - Rationale and key definitions  <i>'But the policy and legislation focusing on those alien pathogens and pathogens spread by IAS specifically affecting wildlife seems affected by some prominent gaps.'</i>	53	Please provide examples on such gaps.	<i>Chapter 2 of the draft study (Rationale and key definitions) is merely a short chapter on the rationale. Gaps are discussed in chapter 6, which will be referenced in chapter 2 of the third draft of the study.</i>
Swedish Environmental Protection Agency	Page 4 § 4 - Alien pathogens and pathogens spread by IAS, an overview	54	Suggestion to include the words " or pathogen". So, the sentence would be as follows: <i>'As a consequence, IAS can have an impact as pathogens themselves or for their role in introducing new and unknown pathogens, altering the epidemiology of local pathogens (e.g. by introducing changes in the vector-host-parasite <b>or pathogen</b> relationship), becoming</i>	<i>The third draft of the study will be amended accordingly.</i>



			<i>reservoir hosts, and so increasing the disease risk for native populations of wild animals and plants’.</i>	
Environment & Resources Authority- Malta	Page 6 § 5.1 – The Bern Convention	55	<p>page 6 of the document makes reference to list of Codes of Conduct adopted by the Bern Convention. However, it is to be noted that there are other Codes of Conduct adapted by the same Convention that are not listed, such as:</p> <ul style="list-style-type: none"> <li>· <a href="#">European Code of Conduct on Recreational Fishing and IAS</a> (2014)</li> <li>· <a href="#">European Code of Conduct on Recreational Boating and IAS</a> (2016)</li> <li>· <a href="#">European Code of Conduct for Invasive Alien Trees</a> (2017)</li> <li>· <a href="#">European Code of Conduct on International Travel and Invasive Alien Species</a> (2017)</li> </ul>	<i>The third draft of the study will be amended accordingly. Two out of four documents mentioned by the reviewer are already reported (European Code of Conduct on Recreational Fishing and IAS (2014), European Code of Conduct on International Travel and Invasive Alien Species (2017), the other two will be included in third draft of the study.</i>
European Commission - DG Environment	Page 6 § 5.2 - The Convention on Biological Diversity  <i>‘In 2018 at its 14th COP the Supplementary Voluntary Guidance [...]’</i>	56	The word “organisms” is missing from the guidance title referenced, please add it	<i>The third draft of the study will be amended accordingly.</i>
Swedish Environmental Protection Agency	Page 8 § 5.2 - The Convention on Biological Diversity	57	<p>Suggestion to include the words " the IPPC". So, the sentence would be as follows: <i>‘This guidance describes integrated processes for its implementation together with the guidance (Annex to Decision XII/16) and existing international standards set for the protection of biodiversity, and the health of animals (The OIE animal health codes and manuals), plants (<b>the IPPC</b> International Standards for Phytosanitary Measures), and highly relevant to manage the pathways of introduction of pathogens associated with trade in live organisms.’</i></p> <p>Moreover, the reviewer suggests to Clarify the responsibility for ISPMs.</p>	<i>The third draft of the study will be amended accordingly.</i>
Federal Ministry for the Environment, Nature - Germany	Page 8 § 5.4 - The WTO Agreement on the Application of Sanitary	58	Suggestion to delete the word " phytosanitary. So, the sentence would be as follows: <i>“Agreement provides a uniform framework for measures governing phytosanitary measures for human, plant and animal life or health”.</i>	<i>The third draft of the study will be amended accordingly</i>

	and Phytosanitary Measures			
Swedish Environmental Protection Agency	<p>Page 8 § 5.4 - The WTO Agreement on the Application of Sanitary and Phytosanitary Measures</p> <p><i>'Sanitary and phytosanitary measures are defined as any measure applied:</i>  <i>a) to protect human, animal or plant life or health (within the Member's Territory) from the entry, establishment or spread of pests, diseases, disease carrying organisms;</i>  <i>b) to prevent or limit other damage (within the Member's Territory) from the entry, establishment or spread of pests.'</i></p>	59	<ol style="list-style-type: none"> <li>1. Please provide reference/links to the citation of the measures</li> <li>2. There need to be a reference for the basis of a) and b)</li> <li>3. Question whether point b) should include reference to the entry, establishment or spread of pests <b>and diseases</b>.</li> </ol>	<i>The third draft of the study will be amended accordingly.</i>
European Commission - DG Environment	<p>Page 10 § 5.6 - The International Plant Protection Convention</p>	60	Suggest to insert a section on EFSA	<i>The third draft of the study will be amended accordingly.</i>
European Commission - DG Environment	<p>Page 11 § 5.8 - The EU Regulation No. 1143/2014 on Invasive Alien Species</p>	61	<p>Suggestion to modify</p> <p><i>'Therefore, <b>any new rules on IAS</b> should be aligned with and not overlap with those legislative acts of the Union, and <b>should not</b> apply to the organisms targeted by those legislative acts.'</i></p> <p>with</p>	<i>The third draft of the study will be amended accordingly.</i>

			<b><i>'Furthermore, Union legislation on plant health includes provisions on organisms which are harmful to plants or plant products. The IAS Regulation aims to be aligned with and not overlap with those legislative acts of the Union, and therefore does not apply to the organisms targeted by those legislative acts.'</i></b>	
European Commission - DG Environment	Page 12 § 5.9 - The EU Animal Health policy and legislation	62	Suggestion to modify the sentence below as follows (additions in bold): <i>'It is worth mentioning also the Commission Implementing Decision 2018/320, through which specific animal health protection measures for import and intra-EU movements of salamanders in relation to the fungus Batrachochytrium salamandrivorans (Bsal) were undertaken, <del>although they should</del> <b>These measures would</b> apply only temporarily <del>(at least initially</del> <b>until 31 December 201, then extended until 20 April 2021<sup>2</sup></b>), until more information will be available to supplement the current knowledge on Bsal (EFSA Panel on Animal Health and Welfare et al. 2018).'</i>	<i>The third draft of the study will be amended accordingly.</i>
European Commission - DG Environment	Page 13 § 6 - Main gaps or constraints	63	Suggestion to modify the sentence below as follows (additions in bold): <i>'<b>Because of climate change and other factors</b>, the increasing movements of humans and <del>movements of other species</del> <del>because of climate change and other factors</del> <b>by humans</b> could result in the sudden emergence of disease outbreaks, including new diseases and in new locations.'</i>	<i>The third draft of the study will be amended accordingly.</i>
Federal Ministry for the Environment, Nature - Germany	Page 14 § 6.1 - Priority research areas  <i>'For this reason, several authors urged the need of increased collaborations between invasion scientists, wildlife</i>	64	Experts in plant health should be included in collaboration i.e EPPO.	<i>The third draft of the study will be amended accordingly</i>

<sup>2</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019D1998&from=FR>

	<i>ecologists, conservation biologists, environmental biologists, disease ecologists, epidemiologists, veterinarians and medical scientists, medical microbiologists and related disciplines on modelling, risk assessment, monitoring and management (Daszak et al. 2001, Oaden et al. 2019, Schindler et al. 2018 ).'</i>			
European Commission - DG Environment	Page 15 § 6.2 - Gaps in policy and legislation, including EU one	65	Suggestion to modify the paragraph title: <i>'Gaps in policy and legislation, including EU one'</i> With <i>'Gaps in policy and legislation'</i>	<i>The third draft of the study will be amended accordingly</i>
European Commission - DG Environment	Page 15 § 6.2 - Gaps in policy and legislation, including EU one  <i>'Apparently the policy and legislation on IAS and wildlife pathogens is mostly fragmented [...]'</i>	66	Please specify: Whose policy is "fragmented"?	<i>This refers to parties in general. The third draft of the study will be amended to clarify this point.</i>
European Commission - DG Environment	Page 15 § 6.2 - Gaps in policy and legislation, including EU one  <i>'For example, Beneult et al. (2014) pointed out the difficulties to know the</i>	67	Please specify: Whose government structure?	<i>This refers to parties in general. The third draft of the study will be amended to clarify this point.</i>

	<i>government structure in charge of wildlife.'</i>			
European Commission - DG Environment	Page 15 § 6.2 - Gaps in policy and legislation, including EU one  <i>'The EU reacted promptly, and in the same year financed a 900,000 euro study [...].'</i>	68	Indeed EU reacted promptly and we therefore request that the previous paragraph is redrafted as above.	<i>Indeed the case of Bsal is an exception and a case of good practice (yet it occurred over 5 years to take action since the description of the new fungus, moreover some authors noted gaps in the response). Things were even worst for any other pathogen, including for example the other chytrid fungus Bd. The paragraph may need to be rephrased, but the point is that in general response to EID in wildlife is not so fast</i>
European Commission - DG Environment	Page 15 § 6.2 - Gaps in policy and legislation, including EU one	69	Suggestion to modify the sentence below as follows (additions in bold): <i>'Nevertheless, Some authors <del>noted</del> considered that there are omissions that weaken[...].'</i>	<i>The third draft of the study will be amended accordingly.</i>
European Commission - DG Environment	Page 15 § 6.2 - Gaps in policy and legislation, including EU one	70	Suggestion to modify the sentence below as follows (additions in bold): <i>'However, while it is too early to assess the impact of such measures, <del>it is evident</del> the experience with Bsal indicates that the time and resources needed to address a single alien pathogen were relatively high and the existing framework [...].'</i>	<i>The third draft of the study will be amended accordingly.</i>
Swedish Environmental Protection Agency	Page 16 § 6.4 - Building on the One Health initiative  <i>'Additionally, plants should deserve greater emphasis within the 'One Health' initiative (Fletcher et al. 2009).'</i>	71	Suggestion to add the words "according to Fletcher et al. (2009)" to clarify that this is the conclusion of the author and not SE or other parter. The text would therefore read as follows: <i>'Additionally, according to Fletcher et al. (2009) plants should deserve greater emphasis within the 'One Health' initiative (Fletcher et al. 2009).'</i>	<i>The third draft of the study will be amended accordingly.</i>
European Commission - DG Environment	Page 18	72	Suggestion to modify the sentence below as follows (additions in bold):	<i>The third draft of the study will be amended accordingly.</i>

	§ 7.2 - Organisation of one or more dedicated workshops		<i>'Participation should be extended to all MS representatives, including from the EU of all Bern Convention Parties,, as well as [...]</i>	
European Commission - DG Environment	Page 19 § 7.5 - Clear formulation of research topics	73	Suggestion to modify the sentence below as follows (additions in bold): <i>'This would also help MS <b>Bern Convention parties</b> and relevant stakeholders [...]</i>	<i>The third draft of the study will be amended accordingly.</i>
Swedish Environmental Protection Agency	Page 18 § 7.6 - Analysis of the current policy and legislation  <i>'The study should take into account the impact of current initiatives, including in relation to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).'</i>	74	We note that EPPO and IPPC representing Plant Health measures, are not mentioned here. Is that on purpose?	<i>The third draft of the study will be amended accordingly.</i>
Federal Ministry for the Environment, Nature - Germany	Page 19 § 7.8 - Identification of key management tools  <i>'Disease Risk Analysis (DRA) protocols should be systematically associated to any movement of animals and plants, either within or between countries.'</i>	75	Far reaching requirement, really any movement?	<i>The sentence may be amended as follows 'Disease Risk Analysis (DRA) protocols should be systematically associated to the movement of animals and plants, either within or between countries.'</i>