

Information on measures and related costs in relation to species included on the Union list – *Trachemys scripta*

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Boets, P. 2019. Information on measures and related costs in relation to species included on the Union list – *Trachemys scripta*. Technical note prepared by IUCN for the European Commission.

Date of completion: 29/08/2019

Comments which could support improvement of this document are welcome. Please send your comments by e-mail to ENV-IAS@ec.europa.eu.

Species (scientific name)	<i>Trachemys scripta</i> , with 3 subspecies <i>T. scripta scripta</i> , <i>T. scripta elegans</i> and <i>T. scripta troostii</i>
Species (common name)	Pond slider (<i>Trachemys scripta</i>), red-eared slider (<i>T. scripta elegans</i>), yellow-bellied slider (<i>T. scripta scripta</i>), Cumberland slider (<i>T. scripta troostii</i>)
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Date Completed	29/08/2019
Reviewer	Riccardo Scalera

Summary Highlight of measures that provide the most cost-effective options to prevent the introduction, achieve early detection, rapidly eradicate and manage the species, including significant gaps in information or knowledge to identify cost-effective measures.
Prevention of escape into the environment Fencing of ponds can be undertaken to prevent escape of individuals from containment into the environment. However, the effectiveness of this measure is only reported for temporary fences used to support eradication campaigns and monitoring, but not for long term application (the species can live up to 40 years) for example for preventing the escape of individuals that are companion animals/pets purchased before the species was listed.

Prevention of reproduction in containment

Surgical sterilisation can be undertaken to prevent captive individuals reproducing.

Secondary spread

In order to prevent secondary spread of *Trachemys scripta* once they have been introduced, fencing can be used for small isolated waterbodies. However fences may also prevent movement of native species and interfere with recreational or other activities and therefore may not be a feasible long term measure. In order to address human assisted secondary spread a public awareness campaign is required to make people aware of the dangers related to releasing *T. scripta* into the wild.

Early detection

For the early detection of *T. scripta*, the most promising tool is with the use of the environmental DNA (eDNA) methods as it allows a quick screening on the presence of *T. scripta* based on a water sample and can be applied across relatively large areas. Citizen science platforms have also shown the potential to provide high chances of detecting the species at an early stage, although confusion with native species is likely among laypeople. The use of basking turtle traps (floating traps used by the *T. scripta* to sunbathe), basking surveys, or the use of sniffer dogs are measures which can support early detection for sites of conservation concern (where native turtles co-occur), or to confirm presence following from possible sightings, but are unlikely to be cost-effective for early detection at a large scale (i.e. national level).

Rapid eradication

To eradicate the species at an early stage of invasion, several methods have been used, however their success is usually limited to a very local scale. Moreover it is often difficult to determine if a population is completely eradicated or if some small population remains. The drainage of ponds (coupled with fencing and traps) has been used in Australia to eradicate populations from isolated water bodies (e.g. agricultural dams). Other methods have also been used but are not known to have successfully led to eradications. This includes the use of basking turtle traps which have been shown to reduce population numbers, shooting, and angling. Additionally, sniffer dogs can be used to detect and destroy nests.

Management

For managing established populations, the measures are the same as described for rapid eradication, but are integrated and applied across different sites. The investment in time and personnel quickly increases with the number of locations being targeted, while the success of capturing the animals (and the effectiveness of management aim, e.g. population reduction) depends on geographic and environmental factors (e.g. size of water body, connectivity with other waterbodies etc.) other than on the specific approach used, and the possibility of further releases in the area. The management of established *T. scripta* populations (either for eradication, population control or

containment) should therefore focus on those locations where ecological damage is known (e.g. where competition with or predation on native turtle species occurs). This does not mean that at other locations no actions need to be undertaken, but given the restrictions in time and budget it is important to prioritize areas and to develop a feasible management strategy. In this respect, risk assessment models (GIS-based) can provide an added value to target those locations where the species is expected to have the highest impact.

Prevention of intentional introductions and spread – measures for preventing the species being introduced intentionally. **This table is repeated for each of the prevention measures identified.** *If the species is listed as an invasive alien species of Union concern, this table is not needed, as the measure applies anyway.*

<p>Measure description Provide a description of the measure, and identify its objective</p>	<p><i>As the species is listed as an invasive alien species of Union concern, the following measures will automatically apply, in accordance with Article 7 of the EU IAS Regulation 1143/2014:</i></p> <p><i>Invasive alien species of Union concern shall not be intentionally:</i></p> <ul style="list-style-type: none"> <i>(a) brought into the territory of the Union, including transit under customs supervision;</i> <i>(b) kept, including in contained holding;</i> <i>(c) bred, including in contained holding;</i> <i>(d) transported to, from or within the Union, except for the transportation of species to facilities in the context of eradication;</i> <i>(e) placed on the market;</i> <i>(f) used or exchanged;</i> <i>(g) permitted to reproduce, grown or cultivated, including in contained holding; or</i> <i>(h) released into the environment.</i> <p><i>Also note that, in accordance with Article 15(1) – As of 2 January 2016, Member States should have in place fully functioning structures to carry out the official controls necessary to prevent the intentional introduction into the Union of invasive alien species of Union concern. Those official controls shall apply to the categories of goods falling within the Combined Nomenclature codes to which a reference is made in the Union list, pursuant to Article 4(5).]</i></p> <p><i>Therefore measures for the prevention of intentional introductions do not need to be discussed further in this technical note.</i></p> <p><i>However, species covered by the restrictions set out under Article 7 of the EU IAS Regulation 1143/2014 may still be kept in containment under the condition that escape and reproduction are not possible, according to:</i></p> <ul style="list-style-type: none"> <i>(1) Articles 8 (Permits) and 9 (Authorisations) which allow for permitted specimens to be kept (reproduction may also be permitted)</i> <i>(2) Articles 17 (Rapid eradication) and 19 (Management) which allow for animals to be kept as part of non-lethal eradication/management measures</i>
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	<p>(3) Article 31 (Transitional provisions for non-commercial owners) which allows non-commercial owners to keep their companion animals until the end of the animals' natural life, provided that these were kept before the inclusion on the Union list</p> <p>(4) Article 32 (Transitional provisions for commercial stocks) which allows commercial owners to keep specimens of invasive alien species of Union concern for up to two years after inclusion on the Union list</p> <p>Therefore, this note includes information on the appropriate measures to ensure that reproduction or escape from containment are not possible, please see 'Prevention of escape into the environment' and 'Prevention of reproduction of contained specimens' tables below.</p>
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Prevention of escape into the environment – measures for preventing the species escaping from containment into the environment (cf. Articles 8, 9, 17, 19, 31, and 32 of the IAS Regulation). This table is repeated for each of the prevention measures identified.	
<p>Measure description Provide a description of the measure, and identify its objective</p>	<p>Fencing of garden ponds The species are usually kept as a pets indoors but are also in outdoor garden ponds, from which they could escape into the wild.</p> <p>The use of fences surrounding waterbodies have been used to contain populations of <i>T. scripta</i>, during surveys and also during eradication campaigns. As an example, in southern France Cadi et al. (2004) used an enclosed 'T' shaped 50 cm high fence placed within 2 m of the edges of the ponds, whereas in the USA Bluett and Schaubert (2014) used a welded wire fence (5.08 x 10.16 cm-mesh; height 1.83m) erected 3 to 6m from the shoreline, with wire extensions into the ground (trenches filled with soil) to prevent escape of larger individuals. The individuals use the available shoreline up to the fence for basking.</p>
<p>Scale of application At what scale is the measure applied? What is the largest scale at which it has been successfully used? Please provide examples, with areas (km² or ha) if possible.</p>	<p>Small individual ponds.</p>

<p>Effectiveness of the measure Is it effective in relation to its objective? Has the measure previously worked, failed?</p> <p>Please select one of the categories of effectiveness (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="640 151 1794 220"> <tr> <td>Effectiveness of measures</td> <td><i>Effective</i></td> <td></td> <td><i>Neutral</i></td> <td></td> <td><i>Ineffective</i></td> <td></td> <td><i>Unknown</i></td> <td>X</td> </tr> </table> <p><i>Rationale:</i> The measure has been shown to be effective to prevent escape for research and eradication purposes (see references noted above), however in these cases fences were temporary and not permanent (or long-term), therefore the long-term (individuals can live for up to 40 years) effectiveness is unknown and will depend upon regular upkeep and maintenance.</p>	Effectiveness of measures	<i>Effective</i>		<i>Neutral</i>		<i>Ineffective</i>		<i>Unknown</i>	X												
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<p>Effort required e.g. period of time over which measure needs to be applied to have results</p>	<p>Would need to be in place for the life span of the turtles (up to 40 years).</p>																					
<p>Resources required¹ e.g. cost, staff, equipment etc.</p>	<p>Materials and tools for fence construction.</p>																					
<p>Side effects (incl. potential) – both positive and negative i.e. positive or negative side effects of the measure on public health, environment including non-targeted species, etc.</p> <p>For each of the side effect types please select one of the impact categories (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="640 655 1888 759"> <tr> <td>Environmental effects</td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td></td> <td><i>Negative</i></td> <td>X</td> </tr> <tr> <td>Social effects</td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td>X</td> <td><i>Negative</i></td> <td></td> </tr> <tr> <td>Economic effects</td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td>X</td> <td><i>Negative</i></td> <td></td> </tr> </table> <p><i>Rationale:</i> Urban ponds including those in private gardens are known to be important for biodiversity (Hassall 2014), and building fences around garden ponds will negatively impact native species by restricting access to water and food supplies, and preventing seasonal movement of amphibious species.</p>	Environmental effects	<i>Positive</i>		<i>Neutral or mixed</i>		<i>Negative</i>	X	Social effects	<i>Positive</i>		<i>Neutral or mixed</i>	X	<i>Negative</i>		Economic effects	<i>Positive</i>		<i>Neutral or mixed</i>	X	<i>Negative</i>	
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<p>Acceptability to stakeholders e.g. impacted economic activities, animal welfare considerations, public perception, etc.</p> <p>Please select one of the categories of acceptability (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="640 1059 1888 1128"> <tr> <td>Acceptability to stakeholders</td> <td><i>Acceptable</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td></td> <td><i>Unacceptable</i></td> <td>X</td> </tr> </table> <p><i>Rationale:</i> Fences as required to prevent escape of <i>T. scripta</i> are likely to be considered an eyesore by owners.</p>	Acceptability to stakeholders	<i>Acceptable</i>		<i>Neutral or mixed</i>		<i>Unacceptable</i>	X														
Acceptability to stakeholders	<i>Acceptable</i>		<i>Neutral or mixed</i>		<i>Unacceptable</i>	X																
<p>Additional cost information¹</p>	<p>No information</p>																					

<p>When not already included above, or in the species Risk Assessment.</p> <ul style="list-style-type: none"> - implementation cost for Member States - the cost of inaction - the cost-effectiveness - the socio-economic aspects <p>Include quantitative &/or qualitative data, and case studies (incl. from countries outside the EU).</p>									
<p>Level of confidence on the information provided ²</p> <p>Please select one of the confidence categories along with a statement to support the category chosen. See <i>Notes</i> section at the bottom of this document.</p> <p>NOTE – this is not related to the effectiveness of the measure</p>	<i>Inconclusive</i>	<input checked="" type="checkbox"/>	<i>Unresolved</i>	<input type="checkbox"/>	<i>Established but incomplete</i>	<input type="checkbox"/>	<i>Well established</i>	<input type="checkbox"/>	<p><i>Rationale:</i> There is little information on the effectiveness or use of fences to contain <i>T. scripta</i>, especially within private gardens.</p>

<p>Prevention of reproduction of contained specimens – measures for preventing the species reproducing while in containment (cf. Articles 17, 18, 31, and 32 of the IAS Regulation). This table is repeated for each of the prevention measures identified.</p>	
<p>Measure description</p> <p>Provide a description of the measure, and identify its objective</p>	<p>Surgical sterilisation</p> <p>Overall, there is little readily available information on the control of fertility of the species (IUCN 2017). In addition to keeping males and females separate, and limiting the availability of nesting habitat (sandy soil), sterilisation of male individuals of the species is a known option. Innis et al. (2013) report that orchiectomy (removal of testes) using coelisocopy (as opposed to shell osteotomy) was found to be a successful, practical and safe minimally invasive surgical techniques for the sterilisation of male chelonians. A large number of <i>T. scripta</i> individuals were captured and relocated to the Pistoia Zoo in Italy, where 43 were surgically sterilised within LIFE Emys project (project LIFE12 NAT/IT/000395 LIFE Emys) – the exact procedure undertaken (Costa Edutainment 2016).</p>

<p>Scale of application At what scale is the measure applied? What is the largest scale at which it has been successfully used? Please provide examples, with areas (km² or ha) if possible.</p>	<p>The application of measure will be to a limited number of individuals due to costs. Innis et al. (2013) performed it on 25 individuals, whereas 43 individuals were surgically castrated as part of the LIFE Emys project (Costa Edutainment 2016).</p>							
<p>Effectiveness of the measure Is it effective in relation to its objective? Has the measure previously worked, failed? Please select one of the categories of effectiveness (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<p><i>Effectiveness of measures</i></p>	<p><i>Effective</i></p>	<p>X</p>	<p><i>Neutral</i></p>	<p><i>Ineffective</i></p>	<p><i>Unknown</i></p>		
<p>Effort required e.g. period of time over which measure needs to be applied to have results</p>	<p>Individuals are held for 24 hours prior to surgery, and full access to water was provided 24 hours pose surgery (Innes et al. 2013). Additional follow up monitoring may be needed.</p>							
<p>Resources required¹ e.g. cost, staff, equipment etc.</p>	<p>Veterinary surgical expertise and facilities.</p>							
<p>Side effects (incl. potential) – both positive and negative i.e. positive or negative side effects of the measure on public health, environment including non-targeted species, etc. For each of the side effect types please select one of the impact categories (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<p><i>Environmental effects</i></p>	<p><i>Positive</i></p>	<p>X</p>	<p><i>Neutral or mixed</i></p>	<p>X</p>	<p><i>Negative</i></p>		
	<p><i>Social effects</i></p>	<p><i>Positive</i></p>	<p>X</p>	<p><i>Neutral or mixed</i></p>	<p>X</p>	<p><i>Negative</i></p>		
	<p><i>Economic effects</i></p>	<p><i>Positive</i></p>	<p>X</p>	<p><i>Neutral or mixed</i></p>	<p>X</p>	<p><i>Negative</i></p>		
	<p><i>Rationale:</i> No side effects are expected.</p>							
<p>Acceptability to stakeholders</p>	<p><i>Acceptability to stakeholders</i></p>	<p><i>Acceptable</i></p>	<p>X</p>	<p><i>Neutral or mixed</i></p>		<p><i>Unacceptable</i></p>		

<p>e.g. impacted economic activities, animal welfare considerations, public perception, etc.</p> <p>Please select one of the categories of acceptability (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<p><i>Rationale:</i> The measure should be seen as acceptable to those keeping <i>T. scripta</i> as pets, depending upon cost of procedure, and especially coelioscopic orchiectomy as the procedure avoids surgery to the shell (and therefore much longer healing times (Innes et al. 2013).</p>								
<p>Additional cost information ¹ When not already included above, or in the species Risk Assessment.</p> <ul style="list-style-type: none"> - implementation cost for Member States - the cost of inaction - the cost-effectiveness - the socio-economic aspects <p>Include quantitative &/or qualitative data, and case studies (incl. from countries outside the EU).</p>	<p>No information available, but it is likely to be a relatively expensive measure to undertake.</p>								
<p>Level of confidence on the information provided ²</p> <p>Please select one of the confidence categories along with a statement to support the category chosen. See <i>Notes</i> section at the bottom of this document.</p> <p>NOTE – this is not related to the effectiveness of the measure</p>	<p><i>Inconclusive</i></p>		<p><i>Unresolved</i></p>		<p><i>Established but incomplete</i></p>	<p>X</p>	<p><i>Well established</i></p>		
<p><i>Rationale:</i> There is limited information available on surgical sterilisation for the species.</p>									

Prevention of un-intentional introductions and spread – measures for preventing the species being introduced un-intentionally (cf. Article 13 of the IAS Regulation). **This table is repeated for each of the prevention measures identified.**

<p>Measure description Provide a description of the measure, and identify its objective</p>	<p>There are no known un-intentional introductions of the species into the EU and therefore this table is left blank. We are treating the escape of individuals from zoos and private collections as intentional introductions (see above).</p>								
<p>Scale of application At what scale is the measure applied? What is the largest scale at which it has been successfully used? Please provide examples, with areas (km² or ha) if possible.</p>									
<p>Effectiveness of the measure Is it effective in relation to its objective? Has the measure previously worked, failed?</p> <p>Please select one of the categories of effectiveness (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<p>Effectiveness of measures</p>	<p><i>Effective</i></p>		<p><i>Neutral</i></p>		<p><i>Ineffective</i></p>		<p><i>Unknown</i></p>	
<p>Effort required e.g. period of time over which measure needs to be applied to have results</p>	<p><i>Rationale:</i></p>								
<p>Resources required¹ e.g. cost, staff, equipment etc.</p>									
<p>Side effects (incl. potential) – both positive and negative i.e. positive or negative side effects of the measure on public health, environment including non-targeted species, etc.</p> <p>For each of the side effect types please select one of the impact categories (with an 'X'), and provide a</p>	<p>Environmental effects</p>	<p><i>Positive</i></p>		<p><i>Neutral or mixed</i></p>		<p><i>Negative</i></p>			
	<p>Social effects</p>	<p><i>Positive</i></p>		<p><i>Neutral or mixed</i></p>		<p><i>Negative</i></p>			
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<p>Acceptability to stakeholders e.g. impacted economic activities, animal welfare considerations, public perception, etc.</p> <p>Please select one of the categories of acceptability (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<p>Acceptability to stakeholders</p>	<p><i>Acceptable</i></p>		<p><i>Neutral or mixed</i></p>		<p><i>Unacceptable</i></p>		
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<p>Level of confidence on the information provided²</p> <p>Please select one of the confidence categories along with a statement to support the category chosen. See <i>Notes</i> section at the bottom of this document.</p> <p>NOTE – this is not related to the effectiveness of the measure</p>	<p><i>Inconclusive</i></p>		<p><i>Unresolved</i></p>		<p><i>Established but incomplete</i></p>		<p><i>Well established</i></p>	
	<p><i>Rationale:</i></p>							

Prevention of secondary spread of the species – measures for preventing the species spreading once they have been introduced (cf. Article 13 of the IAS Regulation). This table is repeated for each of the prevention measures identified.

<p>Measure description Provide a description of the measure, and identify its objective</p>	<p>Fencing of waterbodies where the species is known to be established</p> <p>The species is known to be established in artificial water bodies, e.g. public ponds or fountains within an urban or semi-urban environment including parks etc., due to unwanted pets being released (e.g. in Rome, see Di Santo et al. (2017)). It is important to note that while <i>T. scripta</i> are faithful to home ranges even if the waterbodies lower during the summer, they will migrate to find better habitats if a waterbody completely dries and conditions become unfavourable (Ernst et al. 1994; Wynneken et al. 2008; O’Keeffe 2009). These populations are a potential source of invasion into sub-urban and natural habitats where native biodiversity may be impacted (Di Santo et al. 2017).</p> <p>The most effective measure to prevent the secondary spread from these sites is to undertake an eradication (see below), however fencing can also be used to contain and prevent their spread. As noted in the Prevention of escape into the environment table above, such fences are used during surveys of the species, e.g. Cadi et al. (2004) in southern France who used an enclosed ‘T’ shaped 50 cm high fence placed within 2 m of the edges of the ponds. Also, Bluett and Schaubert (2014) in the USA used a welded wire fence (5.08 x 10.16 cm-mesh; height 1.83m) erected 3 to 6m from the shoreline, with wire extensions into the ground (trenches filled with soil) to prevent escape of larger individuals. The individuals use the available shoreline up to the fence for basking.</p> <p>Fences are also used to prevent escape during eradication measures, e.g. see O’Keeffe (2009) in Australia.</p>									
<p>Scale of application At what scale is the measure applied? What is the largest scale at which it has been successfully used? Please provide examples, with areas (km² or ha) if possible.</p>	<p>While the measure needs to be taken at the very local and small scale, i.e. for each individual water-body, to be effective all artificial water bodies that contain the species within the urban setting will need to be fenced. No evidence of this measure being used for this objective (to prevent spread from urban water bodies) has been found.</p>									
<p>Effectiveness of the measure Is it effective in relation to its objective? Has the measure previously worked, failed?</p> <p>Please select one of the categories of effectiveness (with an ‘X’), and provide a rationale, with supporting evidence and examples if possible.</p>	<p><i>Effectiveness of measures</i></p>	<p><i>Effective</i></p>		<p><i>Neutral</i></p>		<p><i>Ineffective</i></p>		<p><i>Unknown</i></p>	<p><i>X</i></p>	
<p><i>Rationale:</i></p> <p>The measure has been shown to be effective to prevent escape for research and eradication purposes (see references noted above), however in these cases fences were temporary and not permanent (or long-term), contrary to what would be needed to prevent secondary spread. Therefore their effectiveness is unknown.</p> <p>This would not prevent the species from spreading during flooding, or by people actively moving individuals etc.</p>										

<p>Effort required e.g. period of time over which measure needs to be applied to have results</p>	<p>Theoretically within the EU the fences would need to be in place for the life span of the turtles (up to 40 years). Fencing would ideally be combined with measures to capture/eradicate the species from the water bodies, and therefore the fencing could be removed once the eradication is confirmed. However, determining complete eradication seems to be very difficult (García-Díaz et al. 2017).</p>																											
<p>Resources required¹ e.g. cost, staff, equipment etc.</p>	<p>The cost to provide a proper fencing, depends on the size of the environment the species occurs. For example it will be cheaper to fence small ponds or fountains, compared to larger lakes in public parks etc.</p>																											
<p>Side effects (incl. potential) – both positive and negative i.e. positive or negative side effects of the measure on public health, environment including non-targeted species, etc.</p> <p>For each of the side effect types please select one of the impact categories (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="647 392 1888 491"> <tr> <td><i>Environmental effects</i></td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td>X</td> <td><i>Negative</i></td> <td></td> </tr> <tr> <td><i>Social effects</i></td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td>X</td> <td><i>Negative</i></td> <td></td> </tr> <tr> <td><i>Economic effects</i></td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td>X</td> <td><i>Negative</i></td> <td></td> </tr> </table> <p><i>Rationale:</i> The effect on the environment can be negative as the fencing might hamper natural migration of species living in the wild (e.g. amphibians). It might also be effective to maintain other alien species (e.g. crayfish) and thus a positive side effect.</p> <p>No socio-economic side effects are described in literature.</p>							<i>Environmental effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>	X	<i>Negative</i>		<i>Social effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>	X	<i>Negative</i>		<i>Economic effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>	X	<i>Negative</i>	
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<p>Acceptability to stakeholders e.g. impacted economic activities, animal welfare considerations, public perception, etc.</p> <p>Please select one of the categories of acceptability (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="647 799 1888 860"> <tr> <td><i>Acceptability to stakeholders</i></td> <td><i>Acceptable</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td>X</td> <td><i>Unacceptable</i></td> <td></td> </tr> </table> <p><i>Rationale:</i> It is unclear how this measure would be perceived by stakeholders as there is an economic cost, and may lead to negative public perception in relation to animal welfare (for both <i>T. scripta</i> and other species living in the fenced waterbodies) and people may therefore damage fences or even move individuals. The fences may also be seen as an 'eye-sore' by the public and lead to damages due to vandalism. On the other hand there could be potential public support if fencing is seen as a solution to contain the species without the need to remove them. This might allow the species to occur in public ponds minimising the danger of escape and thus increasing the acceptability.</p>							<i>Acceptability to stakeholders</i>	<i>Acceptable</i>		<i>Neutral or mixed</i>	X	<i>Unacceptable</i>															
<i>Acceptability to stakeholders</i>	<i>Acceptable</i>		<i>Neutral or mixed</i>	X	<i>Unacceptable</i>																							
<p>Additional cost information¹ When not already included above, or in the species Risk Assessment.</p> <ul style="list-style-type: none"> - implementation cost for Member States - the cost of inaction - the cost-effectiveness - the socio-economic aspects 	<p>No additional information was found.</p>																											

<p>Include quantitative &/or qualitative data, and case studies (incl. from countries outside the EU).</p>								
<p>Level of confidence on the information provided ²</p> <p>Please select one of the confidence categories along with a statement to support the category chosen. See <i>Notes</i> section at the bottom of this document.</p> <p>NOTE – this is not related to the effectiveness of the measure</p>	<p><i>Inconclusive</i></p>	<p>X</p>	<p><i>Unresolved</i></p>		<p><i>Established but incomplete</i></p>		<p><i>Well established</i></p>	
<p><i>Rationale:</i> There is no information available of the long-term use of this measure for preventing secondary spread</p>								

Prevention of secondary spread of the species – measures for preventing the species spreading once they have been introduced (cf. Article 13 of the IAS Regulation). This table is repeated for each of the prevention measures identified.

<p>Measure description Provide a description of the measure, and identify its objective</p>	<p>Communication and awareness campaigns Secondary spread between waterbodies, and most concerning from urban water bodies to those in natural environments, is also possible through individuals being intentionally moved by people. Therefore effective communication on the potential impacts related to the movement of the species into the wild is key to avoid this form of secondary dispersal. Recent research on the introduction and spread of <i>T. scripta</i> in Bulgaria (Kuzmanova et al. 2018), in Italy (project LIFE12 NAT/IT/000395 LIFE Emys ¹), in Spain and Portugal (project LIFE09 NAT/E/0000529 LIFE Trachemys ², LIFE Trachemys 2013) and in France (Peinado et al. 2011) has shown that there is generally little awareness and knowledge on the possible impacts of the species in the wild. Dedicated communication and awareness campaigns could help to increase the knowledge on the species and reduce the possible impacts from intentional introductions and human assisted secondary spread (see Peinado et al. 2011). It is important to start awareness campaigns at the pet shop, educating pet sellers and informing them on the advice and specifics they need to give to costumers buying sliders (this also applies to other species than the ones which are banned from sale in compliance to the EU Regulation on IAS, the EU Wildlife Trade Regulations and the EU Nature Directives). Several projects in France, Italy and Spain have combined the efforts of habitat restoration, eradication or population control of the species with communication</p>
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¹ LIFE Emys <http://www.lifeemys.eu/en/objective/>

² LIFE Trachemys http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=3821

	<p>campaigns to stakeholders (see for example Valdéon et al. 2010; Carbone 2011, but also the many reports made within the LIFE Trachemys project).</p>									
<p>Scale of application At what scale is the measure applied? What is the largest scale at which it has been successfully used? Please provide examples, with areas (km² or ha) if possible.</p>	<p>Dedicated communication and awareness campaigns on the issue should be carried out at a relatively local/sub-national scale. The reason is that they would be more effective at reaching the target audience if they are organised at a small scale with specific examples for the region and in the local language (see LIFE Trachemys 2013). Good example of this is the LIFE Emys project in Italy which included actions aimed at raising public awareness among students, veterinarians, pet sellers and the general public. For this purpose a booklet was disseminated (mainly in schools), along with a leaflet (for veterinarians, teachers, and pet shop owners). Additionally an educational path was made to invite people to get involved on the issue within a zoological garden, and this was considered an essential element of the project.</p> <p>Another good example is an eradication project that was run in Corsica (Peinado et al. 2011), which was accompanied by an awareness and communication campaign with the objective to inform citizens on the problems related to alien species.</p> <p>Also the LIFE Trachemys project implemented a communication campaign for several locations in Spain and Portugal (LIFE Trachemys 2013), and there have also been similar campaigns in mainland France (Carbone 2011), and Bulgaria (Kuzmanova et al. 2018).</p>									
<p>Effectiveness of the measure Is it effective in relation to its objective? Has the measure previously worked, failed?</p> <p>Please select one of the categories of effectiveness (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<p><i>Effectiveness of measures</i></p>	<p><i>Effective</i></p>	<input type="checkbox"/>	<p><i>Neutral</i></p>	<input type="checkbox"/>	<p><i>Ineffective</i></p>	<input type="checkbox"/>	<p><i>Unknown</i></p>	<p><i>X</i></p>	<p><i>Rationale:</i> Teillac-Deschamps et al. (2009) modelled the effect of management strategies (those that mixed direct action, such as turtle removal, with public education and those that did not) in urban green spaces and used the red-eared slider as an example. They found that direct actions (turtle removal) without public education only had a limited, short term effect on the abundance of feral turtles in green spaces and had no effect on the level of public concern about environmental questions. They showed that a mix of different communication strategies improved people's awareness and altered their behavior with respect to introduced species issues.</p> <p>The LIFE Emys project in Italy obtained positive results on the dissemination of information with regard to the management of alien sliders. They also brought captured individuals to a zoological garden where an educational campaign was coupled to it.</p> <p>The LIFE Trachemys project in Spain and Portugal was able to reach many people but especially scholars through organized activities.</p> <p>However, the actual impact of such campaigns in changing the people behavior is not clear, and there are no elements to assess whether this had any impact on the number of animals released in the environment. In fact, to be successful, the campaign should address the appropriate audience (those responsible of the releases) and should be tailored accordingly. A monitoring</p>

	action to follow the progress of the campaign should also be considered, so to implement corrective measures if the target of the campaign is not achieved. But there is no information in either of these projects to verify whether this was carried out.						
Effort required e.g. period of time over which measure needs to be applied to have results	Such awareness campaigns regarding invasive alien species in general need to be in place continually. The effort required may be high as research has indicated that it is not easy to make people aware of the dangers related to alien species in order to change their behaviour (Teillac-Deschamps et al. 2009).						
Resources required ¹ e.g. cost, staff, equipment etc.	<p>It is difficult to assess the costs related to this measure as it depends on the scale and location that the measure is implemented. Generally the costs are expected to depend on the quality of the campaign, the involvement of communication professionals, the size of the communication and awareness campaign and the methods (and tools) used to communicate. The examples available in literature did not quantify the costs of content generation and dissemination, but rather gave an overall cost of the project including eradication, early detection, communication and awareness.</p> <p>Peinado et al. (2011) gives a description of the different steps that were taken. They made use of an information brochure, large information signs, and stickers, to inform people about the work going on through the project, on how to recognise the species, and what the impacts of IAS are. Other measures to reach the general public were implemented, such as the publication of a small educational book, and the development of an internet website. A similar approach was followed in the LIFE Trachemys project performed in Spain/Portugal where different measures were applied to raise awareness such as a theatre play, a leaflet and visitations of schools.</p>						
Side effects (incl. potential) – both positive and negative i.e. positive or negative side effects of the measure on public health, environment including non-targeted species, etc. For each of the side effect types please select one of the impact categories (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.	Environmental effects	Positive	X	Neutral or mixed		Negative	
	Social effects	Positive		Neutral or mixed	X	Negative	
	Economic effects	Positive		Neutral or mixed	X	Negative	
	<i>Rationale:</i> the general awareness on the impact of other alien species might grow with a positive effect on the environment. A negative side effect from the economic point of view, e.g. for pet dealers, might be that less non-native species might be bought.						
Acceptability to stakeholders	Acceptability to stakeholders	Acceptable		Neutral or mixed	X	Unacceptable	

<p>e.g. impacted economic activities, animal welfare considerations, public perception, etc.</p> <p>Please select one of the categories of acceptability (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<p><i>Rationale:</i> A key stakeholder group to raise awareness with are the operators of pet shops and pet fairs (even though the species is now banned from sale), as it is possible that they will not actively support such a campaign as they may see it as negatively affecting their business.</p>								
<p>Additional cost information ¹ When not already included above, or in the species Risk Assessment.</p> <ul style="list-style-type: none"> - implementation cost for Member States - the cost of inaction - the cost-effectiveness - the socio-economic aspects <p>Include quantitative &/or qualitative data, and case studies (incl. from countries outside the EU).</p>	<p>There is no detailed information available on the costs for this specific type of actions.</p>								
<p>Level of confidence on the information provided ²</p> <p>Please select one of the confidence categories along with a statement to support the category chosen. See <i>Notes</i> section at the bottom of this document.</p> <p>NOTE – this is not related to the effectiveness of the measure</p>	<i>Inconclusive</i>		<i>Unresolved</i>		<i>Established but incomplete</i>	x	<i>Well established</i>		<p><i>Rationale:</i> There is information available on the method in literature (e.g. LIFE Trachemys & LIFE Emys project) but the overall effect of the method is not very well documented, therefore the method is considered established but incomplete.</p>

Surveillance measures to support early detection - Measures to run an effective surveillance system for achieving an early detection of a new occurrence (cf. Article 16). This section assumes that the species is not currently present in a Member State, or part of a Member State's territory. **This table is repeated for each of the early detection measures identified.**

<p>Measure description Provide a description of the measure, and identify its objective</p>	<p>Basking surveys <i>Trachemys scripta</i> is known to bask for prolonged periods and compete with the native <i>Emys orbicularis</i> for basking sites (Cadi and Joli 2003). Basking surveys can be conducted by experts using visual observation (aided with high-powered binoculars or spotting scopes). This method is described in Vogt (2012) and has been used mainly for <i>Graptemys</i> species but can be effectively applied to freshwater turtles that bask at certain times of day and season. This involved floating downstream in a boat or canoe between 09.00 and 11.00am when the turtles are most likely to be basking. A similar method, but shore based, has also been used by Thomson et al. (2010) to identify and even make estimates on abundance of <i>Trachemys scripta</i>. They used X10 binoculars to survey all likely turtle habitat in a single 'pass' in order to avoid counting single turtles multiple times, and stopped the surveys when all habitat in the vicinity had been scanned.</p> <p>Technology could also be used, e.g. remote sensing using drones, to reduce costs and time spent undertaken the surveys, but this has not been tested.</p>								
<p>Scale of application At what scale is the measure applied? What is the largest scale at which it has been successfully used? Please provide examples, with areas (km² or ha) if possible.</p>	<p>The scale of application depends on how the observation is performed, but in general is applied at a site scale, e.g. an individual wetland. Thomson et al. (2010) used the method in the Sacramento river basin at two localities one of 4ha and one of 5.2ha.</p>								
<p>Effectiveness of the measure Is it effective in relation to its objective? Has the measure previously worked, failed?</p> <p>Please select one of the categories of effectiveness (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="645 810 1888 879"> <tr> <td data-bbox="645 810 925 879"><i>Effectiveness of measures</i></td> <td data-bbox="925 810 1115 879"><i>Effective</i></td> <td data-bbox="1115 810 1171 879"></td> <td data-bbox="1171 810 1361 879"><i>Neutral</i></td> <td data-bbox="1361 810 1417 879">x</td> <td data-bbox="1417 810 1608 879"><i>Ineffective</i></td> <td data-bbox="1608 810 1832 879"><i>Unknown</i></td> <td data-bbox="1832 810 1888 879"></td> </tr> </table> <p><i>Rationale:</i> It is unlikely to be an effective early detection measure at a national scale, but may be effective for areas of conservation concern, or for high risk areas that are hydrologically connected to known populations (e.g. up- or downstream in other countries). Vogt (2012) states that the method is most effective for assessing population densities of freshwater turtles.</p>	<i>Effectiveness of measures</i>	<i>Effective</i>		<i>Neutral</i>	x	<i>Ineffective</i>	<i>Unknown</i>	
<i>Effectiveness of measures</i>	<i>Effective</i>		<i>Neutral</i>	x	<i>Ineffective</i>	<i>Unknown</i>			
<p>Effort required e.g. period of time over which measure needs to be applied to have results</p>	<p>Thomson et al. (2010) mention that surveys were between one and several person-hours of effort depending on the extent of the habitat present at each locality, usually with two observers independently surveying for turtles. They surveyed all likely turtle habitat in a single pass in order to avoid counting single turtles multiple times and stopped the surveys when both surveyors scanned all habitat in the vicinity. They searched for basking turtles, heads of swimming turtles, and aquatic surface-basking individuals.</p>								
<p>Resources required¹ e.g. cost, staff, equipment etc.</p>	<p>It needs well trained personnel, boats and survey equipment. Vogt (2012) used the method from a boat and needed two persons (somebody steering the boat and an observer). If the observation is done from the shore, one single person should be sufficient. However, Thomson et al. (2010) also made use of two persons to undertake shore based surveys.</p>								

Side effects (incl. potential) – both positive and negative i.e. positive or negative side effects of the measure on public health, environment including non-targeted species, etc. For each of the side effect types please select one of the impact categories (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.	Environmental effects	<i>Positive</i>	<input checked="" type="checkbox"/>	<i>Neutral or mixed</i>	<input type="checkbox"/>	<i>Negative</i>	<input type="checkbox"/>	
	Social effects	<i>Positive</i>	<input type="checkbox"/>	<i>Neutral or mixed</i>	<input checked="" type="checkbox"/>	<i>Negative</i>	<input type="checkbox"/>	
	Economic effects	<i>Positive</i>	<input type="checkbox"/>	<i>Neutral or mixed</i>	<input checked="" type="checkbox"/>	<i>Negative</i>	<input type="checkbox"/>	
	<i>Rationale:</i> Possibly other invasive alien species (and native species of conservation concern) can be detected which can yield a positive environmental effect. There are no social side effects described in literature.							
Acceptability to stakeholders e.g. impacted economic activities, animal welfare considerations, public perception, etc. Please select one of the categories of acceptability (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.	Acceptability to stakeholders	<i>Acceptable</i>	<input type="checkbox"/>	<i>Neutral or mixed</i>	<input checked="" type="checkbox"/>	<i>Unacceptable</i>	<input type="checkbox"/>	
	<i>Rationale:</i> Visual observations are likely to be considered acceptable as it does not harm the individuals (Vogt 2012, Thomson et al. 2010). However there may be resistance to access and undertake surveys on private land.							
Additional cost information ¹ When not already included above, or in the species Risk Assessment. - implementation cost for Member States - the cost of inaction - the cost-effectiveness - the socio-economic aspects Include quantitative &/or qualitative data, and case studies (incl. from countries outside the EU).	No additional information is available.							
Level of confidence on the information provided ²	<i>Inconclusive</i>	<input type="checkbox"/>	<i>Unresolved</i>	<input type="checkbox"/>	<i>Established but incomplete</i>	<input checked="" type="checkbox"/>	<i>Well established</i>	<input type="checkbox"/>
	<i>Rationale:</i>							

<p>Please select one of the confidence categories along with a statement to support the category chosen. See <i>Notes</i> section at the bottom of this document.</p> <p>NOTE – this is not related to the effectiveness of the measure</p>	<p>There is a description of the method and a few examples given in Vogt (2012). There is also a description of the method in Thomson et al. (2010), but no specific details for the EU are available, therefore the method can be considered established but incomplete.</p>
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<p>Surveillance measures to support early detection - Measures to run an effective surveillance system for achieving an early detection of a new occurrence (cf. Article 16). This section assumes that the species is not currently present in a Member State, or part of a Member State's territory. This table is repeated for each of the early detection measures identified.</p>	
<p>Measure description Provide a description of the measure, and identify its objective</p>	<p>Sniffer dogs Dogs have been employed as the principal detection technique in population studies involving tortoises (Cablk & Heaton 2006) and <i>T. scripta</i> nests (O'Keeffe 2009, LIFE Trachemys 2012b). As with basking surveys, this is not a measure that is suited to be used for early detection at a large scale (e.g. national scale), but could be applied for detection within high risk sites of conservation concern, or as part of an eradication or management programme and is therefore discussed here. As part of an eradication campaign in south-east Queensland, Australia, detection dogs were used to identify nests, and eggs, and were used to verify terrestrial sightings when exact locations were unknown. In this way the method allowed the programme to reduce or eliminate breeding recruitment (O'Keeffe 2009).</p>
<p>Scale of application At what scale is the measure applied? What is the largest scale at which it has been successfully used? Please provide examples, with areas (km² or ha) if possible.</p>	<p>The scale of application is suggested to be at the level of a waterbody, noting that the species can disperse up to 2km from the waterbody to lay eggs (Gibbons et al. 1983 in O'Keeffe 2009). According to the LIFE Trachemys project in Spain and Portugal (LIFE Trachemys 2012b) the dogs can be used to search larger areas if it is done early in the morning and if it is not too hot (in terms of the dogs welfare).</p>

<p>Effectiveness of the measure Is it effective in relation to its objective? Has the measure previously worked, failed?</p> <p>Please select one of the categories of effectiveness (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="645 150 1888 220"> <tr> <td>Effectiveness of measures</td> <td><i>Effective</i></td> <td></td> <td><i>Neutral</i></td> <td><i>x</i></td> <td><i>Ineffective</i></td> <td></td> <td><i>Unknown</i></td> <td></td> </tr> </table> <p><i>Rationale:</i> As a measure for early detection at a national level, the measure will not be effective due to the scale of potential application, but at a site scale level the measure can be used to detect the species and confirm possible sightings, especially in areas where the species is difficult to detect visually.</p> <p>LIFE Trachemys (2012b) mentioned that the measure works for new laid nests or for hatchlings, but that older nests are missed by sniffer dogs which reduces the effectiveness of the measure.</p>	Effectiveness of measures	<i>Effective</i>		<i>Neutral</i>	<i>x</i>	<i>Ineffective</i>		<i>Unknown</i>													
Effectiveness of measures	<i>Effective</i>		<i>Neutral</i>	<i>x</i>	<i>Ineffective</i>		<i>Unknown</i>															
<p>Effort required e.g. period of time over which measure needs to be applied to have results</p>	<p>There is no detailed information given on this in literature. In Europe <i>T. scripta</i> can successfully reproduce in several Mediterranean countries, and lays its eggs between April to June in Spain (Perez-Santigosa et al. 2008) and May to August in France (Cadi et al. 2004). Therefore the use of this method is restricted to the period of eggs and nests being present.</p>																					
<p>Resources required¹ e.g. cost, staff, equipment etc.</p>	<p>There is a need for a trained dog and a dog handler. Training such dogs requires investment in time and money, at least for training and maintenance (including feeding, housing, transport).</p> <p>LIFE Trachemys (2012b) gives a description of the different steps that are taken to train such a dog (familiarization, searching for dummy nests and eggs, searching for real nests), which shows that the resources required can be high depending on the number of dogs trained.</p>																					
<p>Side effects (incl. potential) – both positive and negative i.e. positive or negative side effects of the measure on public health, environment including non-targeted species, etc.</p> <p>For each of the side effect types please select one of the impact categories (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="645 847 1888 954"> <tr> <td>Environmental effects</td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td><i>X</i></td> <td><i>Negative</i></td> <td></td> </tr> <tr> <td>Social effects</td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td><i>X</i></td> <td><i>Negative</i></td> <td></td> </tr> <tr> <td>Economic effects</td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td><i>X</i></td> <td><i>Negative</i></td> <td></td> </tr> </table> <p><i>Rationale:</i> There are no side effects mentioned in literature.</p>	Environmental effects	<i>Positive</i>		<i>Neutral or mixed</i>	<i>X</i>	<i>Negative</i>		Social effects	<i>Positive</i>		<i>Neutral or mixed</i>	<i>X</i>	<i>Negative</i>		Economic effects	<i>Positive</i>		<i>Neutral or mixed</i>	<i>X</i>	<i>Negative</i>	
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<p>Acceptability to stakeholders e.g. impacted economic activities, animal welfare considerations, public perception, etc.</p>	<table border="1" data-bbox="645 1254 1888 1321"> <tr> <td>Acceptability to stakeholders</td> <td><i>Acceptable</i></td> <td><i>x</i></td> <td><i>Neutral or mixed</i></td> <td></td> <td><i>Unacceptable</i></td> <td></td> </tr> </table>	Acceptability to stakeholders	<i>Acceptable</i>	<i>x</i>	<i>Neutral or mixed</i>		<i>Unacceptable</i>															
Acceptability to stakeholders	<i>Acceptable</i>	<i>x</i>	<i>Neutral or mixed</i>		<i>Unacceptable</i>																	

Please select one of the categories of acceptability (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.	<i>Rationale:</i> Since the dog is specifically trained to find the alien <i>T. scripta</i> and does not harm or disturbs native species the measure can be considered acceptable. This is not specifically stated in literature but deduced by the author based on LIFE Trachemys (2012b).							
Additional cost information ¹ When not already included above, or in the species Risk Assessment. - implementation cost for Member States - the cost of inaction - the cost-effectiveness - the socio-economic aspects Include quantitative &/or qualitative data, and case studies (incl. from countries outside the EU).	There is no information available on the costs in literature.							
Level of confidence on the information provided ² Please select one of the confidence categories along with a statement to support the category chosen. See <i>Notes</i> section at the bottom of this document. NOTE – this is not related to the effectiveness of the measure	<i>Inconclusive</i>		<i>Unresolved</i>		<i>Established but incomplete</i>	x	<i>Well established</i>	
	<i>Rationale:</i> Specifically for the red-eared slider there is the study of O’Keeffe (2009) mentioning the use of a sniffer dog and the test described in Spain/Portugal (LIFE Trachemys 2012b). There are other studies mentioning the use of sniffer dogs to search for nests of terrestrial or marine tortoises (for example see Witherington et al. 2017).							

Surveillance measures to support early detection - Measures to run an effective surveillance system for achieving an early detection of a new occurrence (cf. Article 16). This section assumes that the species is not currently present in a Member State, or part of a Member State’s territory. This table is repeated for each of the early detection measures identified.	
Measure description Provide a description of the measure, and identify its objective	Environmental DNA (eDNA) The currently established methods to detect <i>T. scripta</i> is based on visual observation, via (baited) trapping or the use of sniffer dogs (see other surveillance tables). However, these often only yield results if the species is already well established missing the opportunity for early detection to support rapid eradication measures. Moreover, identification mistakes can be made when

	<p>visual observations are performed. Environmental DNA (eDNA) can successfully be used to detect the occurrence of rare or alien species in aquatic environments, and also to support the confirmation of eradication (Rees et al. 2014, Valentini et al. 2016, Harper et al. 2018, Hering et al. 2018). Environmental DNA, is DNA that is shed by the organism (cellular or extracellular) and released into the environment, in this case water. Via a water sample the species can be detected based on the extraction of DNA coupled to DNA amplification and DNA matching with sequence information present in databases (e.g. Genbank³). The eDNA method has gained a lot of interest during the last years and has been proven to be a reliable and cost-effective method, especially to detect alien invasive species (Herder et al. 2014). However, eDNA will not distinguish between alive and dead animals, and will also not locate the individuals of the species, and therefore follow up ‘traditional’ surveys may be needed to confirm the presence and exact location. There is currently a COST action specifically addressing the use of eDNA in biomonitoring (see DNAqua project⁴).</p> <p>Recently, Davy et al. (2015) developed primers to detect 8 native and 1 alien (<i>T. scripta</i>) freshwater turtles species to Canada based on eDNA. However, once the species specific primers developed by Davy et al. (2015) are tested in Europe and yield positive results, a collection of water samples and testing of the occurrence of <i>T. scripta</i> will be possible at a large scale across different water body types. Caution should be paid to the environmental conditions, since temperature, solar radiation, presence of organic material, and other environmental factors can influence the detection of the species using this method (Davy et al. 2015). In addition, species specific primers can sometimes vary across different continents and probably need optimisation. Therefore, at this stage future specific testing for <i>T. scripta</i> in Europe and a standard protocol are necessary to apply this tool on a large scale (personal experience of the author). Once this protocol is available the method can be applied at several locations at once.</p>
<p>Scale of application At what scale is the measure applied? What is the largest scale at which it has been successfully used? Please provide examples, with areas (km² or ha) if possible.</p>	<p>In their research Davy et al. (2015) tested the method for <i>T. scripta</i> on a small natural pond (3.5 m diameter, 1 m deep) in Canada. However, eDNA monitoring programmes can be established at large scales, for example across whole watersheds as is currently being undertaken for alien Asian carp monitoring in the Upper Illinois River and Chicago area waterway system (AsianCarp US 2018), or across multiple watersheds at a national scale as was done in the UK as part of a non-targeted macro-invertebrate sampling programme based on metabarcoding (Blackman et al. 2017). While this measure could be applied in all EU Member States at risk of invasion from <i>T. scripta</i> it will be impossible to monitor all waterbodies for the species, therefore areas at high risk of introduction or sites sensitive to the impacts from <i>T. scripta</i> may need to be prioritised for monitoring.</p>

³ GenBank <https://www.ncbi.nlm.nih.gov/genbank/>

⁴ DNAqua <http://dnaqua.net/>

<p>Effectiveness of the measure Is it effective in relation to its objective? Has the measure previously worked, failed?</p> <p>Please select one of the categories of effectiveness (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="645 153 1888 220"> <tr> <td><i>Effectiveness of measures</i></td> <td><i>Effective</i></td> <td>X</td> <td><i>Neutral</i></td> <td></td> <td><i>Ineffective</i></td> <td></td> <td><i>Unknown</i></td> <td></td> </tr> </table> <p><i>Rationale:</i> The approach can be considered effective as it has a higher efficiency compared to traditional visual observation or trapping (see Davy et al. 2015). However, additional testing of the specific primers for use in Europe are still required, and some optimization is still needed with regard to the tools implementation in general biomonitoring programmes (see Herring et al. 2018). In addition, as discussed above it will be impossible to apply to all waterbodies, and therefore the measure should be combined with other surveillance tools (e.g. citizen science, traps, etc.) to be more effective.</p> <p>The measure will also be an effective tool to support the confirmation of eradication success (see García-Díaz et al. 2017).</p>	<i>Effectiveness of measures</i>	<i>Effective</i>	X	<i>Neutral</i>		<i>Ineffective</i>		<i>Unknown</i>													
<i>Effectiveness of measures</i>	<i>Effective</i>	X	<i>Neutral</i>		<i>Ineffective</i>		<i>Unknown</i>															
<p>Effort required e.g. period of time over which measure needs to be applied to have results</p>	<p>As an early detection measure it will need to be applied while there is a risk of introduction.</p>																					
<p>Resources required¹ e.g. cost, staff, equipment etc.</p>	<p>Davy et al. (2015) assumed a sampling effort of 10 water samples for eDNA testing per site, resulting in an estimated cost of 500 Canadian dollar (ca. 330 Euro) to detect a single species at a single site using eDNA. A review by Herder et al. (2014) on the possible applications of eDNA for the detection of IAS in Europe found that costs are associated with the <i>sampling</i> which vary depending upon multiple factors, and the <i>analysis of the samples</i> which has an average cost of €150 per sample (for single species). However costs increase when additional factors are included that influence the reliability of the results (e.g. number of replicates, inclusion of positive and negative controls), and that investment is required in validation of the primers and measures to prevent contamination.</p> <p>Specifics on the eDNA method as well as its potential can be found in Deiner et al. (2017).</p>																					
<p>Side effects (incl. potential) – both positive and negative i.e. positive or negative side effects of the measure on public health, environment including non-targeted species, etc.</p> <p>For each of the side effect types please select one of the impact categories (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="645 978 1888 1082"> <tr> <td><i>Environmental effects</i></td> <td><i>Positive</i></td> <td>X</td> <td><i>Neutral or mixed</i></td> <td></td> <td><i>Negative</i></td> <td></td> </tr> <tr> <td><i>Social effects</i></td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td>X</td> <td><i>Negative</i></td> <td></td> </tr> <tr> <td><i>Economic effects</i></td> <td><i>Positive</i></td> <td>X</td> <td><i>Neutral or mixed</i></td> <td></td> <td><i>Negative</i></td> <td></td> </tr> </table> <p><i>Rationale:</i> The environmental effects are expected to be positive as the application of this technique also allows the monitoring of native freshwater turtles at the same time and with the same method, therefore not only providing environmental, but also economic benefits (cost-effectiveness for conservation budgets).</p>	<i>Environmental effects</i>	<i>Positive</i>	X	<i>Neutral or mixed</i>		<i>Negative</i>		<i>Social effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>	X	<i>Negative</i>		<i>Economic effects</i>	<i>Positive</i>	X	<i>Neutral or mixed</i>		<i>Negative</i>	
<i>Environmental effects</i>	<i>Positive</i>	X	<i>Neutral or mixed</i>		<i>Negative</i>																	
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<p>Acceptability to stakeholders e.g. impacted economic activities, animal welfare considerations, public perception, etc.</p> <p>Please select one of the categories of acceptability (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="638 150 1883 220"> <tr> <td><i>Acceptability to stakeholders</i></td> <td><i>Acceptable</i></td> <td style="text-align: center;">x</td> <td><i>Neutral or mixed</i></td> <td></td> <td><i>Unacceptable</i></td> <td></td> </tr> </table> <p><i>Rationale:</i> The method has an advantage compared to traditional methods with regard to animal welfare as it is considered non-invasive as it does not physically target the species itself (e.g. like traps). Therefore, the perception of the method, especially with the public, is positive (Geerts et al. 2018). This method allows monitoring of the species at a larger scale compared to traditional survey methods, but the initial costs and expertise needed can be a hurdle to implement this directly at the large scale.</p>	<i>Acceptability to stakeholders</i>	<i>Acceptable</i>	x	<i>Neutral or mixed</i>		<i>Unacceptable</i>		
<i>Acceptability to stakeholders</i>	<i>Acceptable</i>	x	<i>Neutral or mixed</i>		<i>Unacceptable</i>				
<p>Additional cost information¹ When not already included above, or in the species Risk Assessment.</p> <ul style="list-style-type: none"> - implementation cost for Member States - the cost of inaction - the cost-effectiveness - the socio-economic aspects <p>Include quantitative &/or qualitative data, and case studies (incl. from countries outside the EU).</p>	<p>According the review by Herder et al. (2015) it is not possible to say that in general eDNA is more cost-efficient than traditional methods, as this depends on the target species. There are no detailed studies available of the costs of monitoring <i>T. scripta</i> based on eDNA in Europe. However, Davy et al. (2015) found that the cost of detection through traditional surveys was 2 to 10 times higher than eDNA detection for freshwater turtles (inc. <i>T. scripta</i>), and concluded that eDNA surveys could provide a cost-effective alternative to the variable outcomes of traditional detection methods for freshwater turtles.</p> <p>In addition, Herder et al. (2014) found that increasing the species being detected increases the costs of analysis of samples by €40 per extra species, though recommends that if more than three species are being detected next generation sequencing is needed and costs rise to around €350 per group of species (e.g. amphibians, or fish), with €100 to €200 for each additional group.</p>								
<p>Level of confidence on the information provided²</p> <p>Please select one of the confidence categories along with a statement to support the category chosen. See <i>Notes</i> section at the bottom of this document.</p> <p>NOTE – this is not related to the effectiveness of the measure</p>	<table border="1" data-bbox="638 847 1924 917"> <tr> <td><i>Inconclusive</i></td> <td></td> <td><i>Unresolved</i></td> <td></td> <td><i>Established but incomplete</i></td> <td style="text-align: center;">x</td> <td><i>Well established</i></td> <td></td> </tr> </table> <p><i>Rationale:</i> The method is established and has been tested in the field as well as in the lab (Davy et al. 2015), but the application in the field (specifically for <i>T. scripta</i>), especially at the large scale, is not documented in literature. Therefore, some caution is needed with regard to field application. At the moment there is a need for standardisation of the eDNA method, and there is a specific workgroup as part of the EU COST Action DNAqua-Net project trying to streamline the use of this method. Nevertheless the method has been used in several studies and has proven its reliability (e.g. Geerts et al. 2018; Deiner et al. 2017; Herder et al. 2014.)</p>	<i>Inconclusive</i>		<i>Unresolved</i>		<i>Established but incomplete</i>	x	<i>Well established</i>	
<i>Inconclusive</i>		<i>Unresolved</i>		<i>Established but incomplete</i>	x	<i>Well established</i>			

Surveillance measures to support early detection - Measures to run an effective surveillance system for achieving an early detection of a new occurrence (cf. Article 16). This section assumes that the species is not currently present in a Member State, or part of a Member State's territory. **This table is repeated for each of the early detection measures identified.**

<p>Measure description Provide a description of the measure, and identify its objective</p>	<p>Citizen Science A surveillance measure to support early detection is an online platform where sightings of the species can be posted based on citizen science. Citizen-science species occurrence datasets are increasingly recognized as a valid tool for monitoring the occurrence and spread of invasive alien species across large spatial and temporal scales (Roy et al. 2015). A good example of this kind of platform is observation.org (and its country derivatives). This platform allows people to post visual observations of species including invasive alien species such as <i>T. scripta</i>. The objective of the measure is to have good observations, since based on these sightings the species can be detected at an early stage and thus targeted for control or eradication. Besides online platforms, many smartphone apps have been developed to record sightings of species. A COST action has been recently launched on “Increasing understanding of alien species through citizen science” (COST Action Alien-CSI⁵). This COST action specifically aims to establish a European-wide citizen science alien species network with the goal of fostering collaboration to increase data gathering capacity and exchange of information on alien species (Roy et al. 2018).</p> <p>However, these data-platforms are mainly dependent on citizen-scientists who collect and upload data, typically from ‘opportunistic sampling’ with no underlying scientific survey design (Boakes et al. 2010) which can limit the conclusions that can be drawn from these data (Isaac et al., 2014) and may lead to a delay in detecting a new presence of the species. Most parts of north-west Europe have an extensive network of volunteer observers although this is less the case for southern and especially eastern Europe (Boakes et al. 2010). Unstructured citizen-science data do not reliably allow to estimate species abundance or population trends (Kamp et al. 2016), yet in an early-warning scenario it is likely sufficient to know where a species is establishing, and these data limitations are thus of a lesser concern.</p>
<p>Scale of application At what scale is the measure applied? What is the largest scale at which it has been successfully used? Please provide examples, with areas (km² or ha) if possible.</p>	<p>The measure can be applied at the European scale, but also a country scale. Observation International provides the site⁶ with many regional aliases and apps for mobile devices: ObsMapp (Android), iObs (iOS) and WinObs (Windows). For example on Observation.org for Belgium, 150 observations are present for <i>T. scripta</i>. These data have been used to locate the occurrence of the species in the province of East-Flanders (Belgium) and to start management programs (authors’ experience).</p>

⁵ Alien CSI <https://alien-csi.eu/>

⁶ Observation International <https://observation.org/>

<p>Effectiveness of the measure Is it effective in relation to its objective? Has the measure previously worked, failed?</p> <p>Please select one of the categories of effectiveness (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="640 153 1888 220"> <tr> <td><i>Effectiveness of measures</i></td> <td><i>Effective</i></td> <td></td> <td><i>Neutral</i></td> <td>x</td> <td><i>Ineffective</i></td> <td></td> <td><i>Unknown</i></td> <td></td> </tr> </table> <p><i>Rationale:</i> In general, online citizen science platforms can be used to set-up an early warning system to detect alien species (Gallo & Waitt 2011). However, the species may be confused with a number of other freshwater turtles alien to Europe, particularly belonging to the closely related genera <i>Chrysemys</i> and <i>Pseudemys</i> (although there are morphological features which may provide good diagnostic hints). Therefore the stakeholders engaged will need to be informed (e.g. see GB Non-native Species Secretariat guide⁷) or trained on the observation and identification of the species. This may lead to problems of misidentification and misreporting. For example, in a recent study on the distribution and biogeography of amphibians and reptiles of Europe (Silliero et al. 2014), the authors warn that the records of <i>T. scripta</i> might also include records of introduced specimens of other <i>Trachemys</i> species or even related genera (e.g. the alien <i>Chrysemys picta</i>). Also according to Kraus (2009) there are records of <i>T. scripta</i> in Germany which have been misreported as <i>Chrysemys picta</i>. It is important to have observations submitted to a quality control/validation process (for example based on pictures checked by experts) (Gallo & Waitt 2011). Moreover, in some Member States (for example Belgium) only the invasive alien species occur (Belgium has no native turtle species) and consequently it is easier to identify <i>T. scripta</i>.</p>	<i>Effectiveness of measures</i>	<i>Effective</i>		<i>Neutral</i>	x	<i>Ineffective</i>		<i>Unknown</i>													
<i>Effectiveness of measures</i>	<i>Effective</i>		<i>Neutral</i>	x	<i>Ineffective</i>		<i>Unknown</i>															
<p>Effort required e.g. period of time over which measure needs to be applied to have results</p>	<p>Different aspects need to be considered when implementing this measure: 1) educate/train people in order to reduce misidentifications, 2) provide an online platform where actual observations can be posted (which may already exist for other alien species), 3) have as many platforms connected in order to avoid scattered information (data management), 4) have a quality check by local experts on the data posted and 5) make it easy accessible and easy to retrieve data.</p>																					
<p>Resources required¹ e.g. cost, staff, equipment etc.</p>	<p>The main cost is the cost needed to provide an online platform and to maintain the data (data management), however such systems may already exist for other alien species citizen science programs within Member States. There is also a cost related to the educational aspect in order to inform or train observers.</p>																					
<p>Side effects (incl. potential) – both positive and negative i.e. positive or negative side effects of the measure on public health, environment including non-targeted species, etc.</p> <p>For each of the side effect types please select one of the impact categories (with an 'X'), and provide a</p>	<table border="1" data-bbox="640 975 1888 1082"> <tr> <td><i>Environmental effects</i></td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td>x</td> <td><i>Negative</i></td> <td></td> </tr> <tr> <td><i>Social effects</i></td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td>x</td> <td><i>Negative</i></td> <td></td> </tr> <tr> <td><i>Economic effects</i></td> <td><i>Positive</i></td> <td>X</td> <td><i>Neutral or mixed</i></td> <td></td> <td><i>Negative</i></td> <td></td> </tr> </table> <p><i>Rationale:</i> The involvement of citizens into the observations of alien species can have a positive environmental effect as they increase awareness about the problems related to alien species and their impacts, and may even contribute to the management of the species in general. However, Teillac-Deschamps et al. (2009) found that the concern about general environmental questions is often limited even if there is a public awareness campaign organized. In addition, setting up such an online platform can also be useful to get data and thus information on other (alien) species (Roy et al. 2018).</p>	<i>Environmental effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>	x	<i>Negative</i>		<i>Social effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>	x	<i>Negative</i>		<i>Economic effects</i>	<i>Positive</i>	X	<i>Neutral or mixed</i>		<i>Negative</i>	
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⁷ GB NNSS <http://www.nonnativespecies.org/downloadDocument.cfm?id=78>

<p>rationale, with supporting evidence and examples if possible.</p>								
<p>Acceptability to stakeholders e.g. impacted economic activities, animal welfare considerations, public perception, etc.</p> <p>Please select one of the categories of acceptability (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<p>Acceptability to stakeholders</p>	<p><i>Acceptable</i></p>	<p>x</p>	<p><i>Neutral or mixed</i></p>		<p><i>Unacceptable</i></p>		<p><i>Rationale:</i> The measure will be generally accepted by most stakeholders, and is already being used for several species worldwide.</p>
<p>Additional cost information¹ When not already included above, or in the species Risk Assessment.</p> <ul style="list-style-type: none"> - implementation cost for Member States - the cost of inaction - the cost-effectiveness - the socio-economic aspects <p>Include quantitative &/or qualitative data, and case studies (incl. from countries outside the EU).</p>	<p>A general COST action has been launched but does not provide specific details on the costs for this specific species.</p>							
<p>Level of confidence on the information provided²</p> <p>Please select one of the confidence categories along with a statement to support the category chosen. See <i>Notes</i> section at the bottom of this document.</p> <p>NOTE – this is not related to the effectiveness of the measure</p>	<p><i>Inconclusive</i></p>		<p><i>Unresolved</i></p>	<p><i>Established but incomplete</i></p>	<p>x</p>	<p><i>Well established</i></p>	<p><i>Rationale:</i> The method is described in general in literature, but not specifically for alien sliders. It is not clear (there are no exact numbers) to what extent citizen science and these online platforms help in terms of early detection. It is shown (see Gallo & Waitt 2011) that this measure can help, but it is not quantified.</p>	

Surveillance measures to support early detection - Measures to run an effective surveillance system for achieving an early detection of a new occurrence (cf. Article 16). This section assumes that the species is not currently present in a Member State, or part of a Member State's territory. **This table is repeated for each of the early detection measures identified.**

<p>Measure description Provide a description of the measure, and identify its objective</p>	<p>Use of passive trapping methods An additional surveillance method is the use of basking turtle traps or nets (for more details see also physical removal under rapid eradication for new introductions below). Basking turtle traps (Scalera 2006; Vald3on et al. 2010; LIFE Trachemys 2012a,b) have been mainly used to capture <i>T. scripta</i> and have been found to be more effective compared to nets (Garc3a-D3az et al. 2017), though the effort needed to set up and control basking traps or nets is quite high (LIFE Trachemys 2012 a,b).</p> <p>The objective of this measure is to set up a monitoring system at sites at high risk to introductions within Member States that are known to be vulnerable. These sites could include (semi-)urban water bodies, natural water bodies close to urban, or water bodies connected to sites with known populations in other countries. The identification of high risk sites can be supported by distribution models to predict the potential range expansion, or identify areas where the species might reproduce in the wild (in the future). Ficetola et al. (2009) found that bioclimatic differences can determine the areas where aliens become invaders. Early detection could be focused to these source areas. However, climate change can increase fitness in the future, and therefore the interactions between climate change and fitness can boost the invasiveness of this alien species (Ficetola et al. 2009).</p> <p>In practice the use of the traps is often started when observations have been made to find out how big a population is (see LIFE Trachemys project in Spain and Italy). Therefore in terms of early detection, this measure may be more suited to surveying priority sites (e.g. of conservation value) in response to secondary spread of the species once it has established. The measure can also be used to confirm possible sightings of the species, e.g. through citizen science.</p> <p>The establishment of a monitoring system based on traps would be less feasible compared to existing monitoring systems such as the one used for crayfish (e.g. a citizen science project in The Netherlands monitoring crayfish, see Koese & Evers (2011)) as traps used for crayfish are small, cheap and can be easily transported. The crayfish monitoring project in the Netherlands is an example of how the two methods, active trapping and citizen science, can be combined.</p>
<p>Scale of application At what scale is the measure applied? What is the largest scale at which it has been successfully used? Please provide examples, with areas (km² or ha) if possible.</p>	<p>Applying these turtle traps for observational purposes is a relatively large investment (see for detail on costs for applying basking turtle traps under rapid eradication below; Bugter et al. 2011). Although basking turtle traps and nets can provide reliable evidence of the species being present, it is not feasible to apply this at the large scale (personal experience of the author). If the method is applied it will be likely at the scale of a catchment, nature reserve or a single water body, like a lake or pond. Several projects in Spain, Italy, France and Portugal mention the use of a range of trapping methods (see for example LIFE Trachemys 2012b).</p>

<p>Effectiveness of the measure Is it effective in relation to its objective? Has the measure previously worked, failed?</p> <p>Please select one of the categories of effectiveness (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="645 151 1888 220"> <tr> <td><i>Effectiveness of measures</i></td> <td><i>Effective</i></td> <td></td> <td><i>Neutral</i></td> <td>X</td> <td><i>Ineffective</i></td> <td></td> <td><i>Unknown</i></td> <td></td> </tr> </table> <p><i>Rationale:</i> For an objective of early detection within a Member State, the measure is not really feasible to be applied across a large geographic scale, however it could be applied to high risk sites, especially if they are connected to areas that have populations of the species in other Member States.</p> <p>A possible method to increase the effectiveness of the measure is to install camera traps on the basking turtle traps. This provides extra evidence of the species being present or not, even if the species is not caught (this has been tested in Belgium, personal experience of the author). Camera traps have also been tested in the LIFE Trachemys project with varying success (see LIFE Trachemys 2012b, c). Basking traps are frequently used to provide a platform for <i>T. scripta</i> to bask and facilitate direct observations. Vogt (2012) states that basking turtle traps are not adequate for routine sampling, because the turtles must become accustomed to the newly offered basking areas.</p>	<i>Effectiveness of measures</i>	<i>Effective</i>		<i>Neutral</i>	X	<i>Ineffective</i>		<i>Unknown</i>													
<i>Effectiveness of measures</i>	<i>Effective</i>		<i>Neutral</i>	X	<i>Ineffective</i>		<i>Unknown</i>															
<p>Effort required e.g. period of time over which measure needs to be applied to have results</p>	<p>The effort can be considered quite large as the cost for placing and controlling such a basking turtle trap (Bugter et al. 2011, LIFE Emys project and many more projects) is high. The best time to trap is during spring and summer when individuals are more likely to be found basking. Traps have to be checked at least once a day (potentially more often) depending on several factors, including presence of (other) predators, heat etc. which may kill the bycatch.</p> <p>Below is the cost given for constructing, placing and checking as well as removing basking turtle traps (Bugter et al. 2011). The costs are given in the framework of a project aiming at the removal of the species, but certain steps of the action are similar with using basking turtle traps for observation.</p> <ul style="list-style-type: none"> • Estimated price per trap = € 150 (Sundeck traps are available for purchase from €152) • Labour per hour including placing, checking as well as removing the traps = € 70 (depended on the country) <p>See for details on cost “rapid eradications for new introductions” where the measure is explained in detail. There is no detailed cost of the implementation of this measure, as the overall project cost only is mentioned.</p>																					
<p>Resources required¹ e.g. cost, staff, equipment etc.</p>	<p>The large trapping efforts reported by García-Díaz et al. (2017) imply a large investment is required. Bugter et al. (2011), the LIFE Emys project and other researchers (e.g. Valdeón et al. 2010) made an evaluation of the cost (see rapid eradication for new introductions) when using such traps for the capture and physical removal of the species.</p>																					
<p>Side effects (incl. potential) – both positive and negative i.e. positive or negative side effects of the measure on public health, environment including non-targeted species, etc.</p>	<table border="1" data-bbox="645 1209 1888 1313"> <tr> <td><i>Environmental effects</i></td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td>X</td> <td><i>Negative</i></td> <td></td> </tr> <tr> <td><i>Social effects</i></td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td></td> <td><i>Negative</i></td> <td></td> </tr> <tr> <td><i>Economic effects</i></td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td></td> <td><i>Negative</i></td> <td></td> </tr> </table> <p><i>Rationale:</i> The use of basking turtle traps has no side-effect on other species as the turtle traps are selective, but will capture native turtles. For fyke nets this is somewhat different as these often have by-catch (fish, crayfish, frogs, salamanders, sliders,</p>	<i>Environmental effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>	X	<i>Negative</i>		<i>Social effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>		<i>Negative</i>		<i>Economic effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>		<i>Negative</i>	
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<p>For each of the side effect types please select one of the impact categories (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<p>birds, mammals etc. which may predate each other into the net or drawn). Floating devices to ensure that a part of the net is above water level and allow for species with lungs to breath the air are needed, so to prevent by catch mortality. There are no socio-economic side effects reported in literature.</p>								
<p>Acceptability to stakeholders e.g. impacted economic activities, animal welfare considerations, public perception, etc.</p> <p>Please select one of the categories of acceptability (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<p>Acceptability to stakeholders</p>	<p><i>Acceptable</i></p>		<p><i>Neutral or mixed</i></p>	<p>X</p>	<p><i>Unacceptable</i></p>		<p><i>Rationale:</i> The cost is high (for details see rapid eradication for new introductions) and the perception of the species being present in the wild is not always negative (Kuzmanova et al. 2018). The use of traps and especially nets may lead to negative perceptions from fishermen, and general public.</p>	
<p>Additional cost information¹ When not already included above, or in the species Risk Assessment.</p> <ul style="list-style-type: none"> - implementation cost for Member States - the cost of inaction - the cost-effectiveness - the socio-economic aspects <p>Include quantitative &/or qualitative data, and case studies (incl. from countries outside the EU).</p>	<p>No additional costs are reported in literature.</p>								
<p>Level of confidence on the information provided²</p> <p>Please select one of the confidence categories along with a statement to support the category chosen. See <i>Notes</i> section at the bottom of this document.</p> <p>NOTE – this is not related to the effectiveness of the measure</p>	<p><i>Inconclusive</i></p>		<p><i>Unresolved</i></p>		<p><i>Established but incomplete</i></p>		<p><i>Well established</i></p>	<p>x</p>	<p><i>Rationale:</i> The information on the use of turtle traps has been well studied (see Scalera 2006; Valdéon et al. 2010, LIFE Trachemys 2012b and many other projects). In addition a cost calculation (Bugter et al. 2011) and model on removal has been made by García-Díaz et al. (2017). The methods to catch the species are well described. However, in the context of surveillance to support early detection the method is not reported as such in literature.</p>

Rapid eradication for new introductions - Measures to achieve eradication at an early stage of invasion, after an early detection of a new occurrence (cf. Article 17). This section assumes that the species is not currently present in a Member State, or part of a Member State's territory. **This table is repeated for each of the eradication measures identified.**

<p>Measure description Provide a description of the measure, and identify its objective</p>	<p>Physical removal via draining of the pond The objective is to drain the waterbody where <i>T. scripta</i> is present, making individuals easier to be manually removed. The measure can be combined with seine nets to remove individuals before the water body is drained.</p> <p>This measure can only practically be done in relatively small isolated habitats of rather low ecological status (O’Keeffe 2006; O’Keeffe 2009; Bugter et al. 2011). This is due to the fact that interconnected habitats cannot be drained easily and the draining of natural habitats with a high ecological status may negatively impact many local species. Following drainage <i>T. scripta</i> will burrow into the silt (up to 2 m deep) and therefore the silt needs to be removed, e.g. by mechanical excavation, spread out in a secure area and the sliders need to be removed by hand (O’Keeffe 2009). When a water body is drained rapidly, up to 75% of the sliders will try to emigrate (O’Keeffe 2009). Therefore, before draining water bodies, sites need to be secured with barrier fences and pitfall traps to prevent emigration (O’Keeffe 2009; Vogt 2012). In addition O’Keeffe (2009) recovered and relocated native fauna, and filled in and then compacted the drained waterbody. The measure has been applied in Australia, but is not reported for Europe.</p>									
<p>Scale of application At what scale is the measure applied? What is the largest scale at which it has been successfully used? Please provide examples, with areas (km² or ha) if possible.</p>	<p>This method is reported in literature to be applied at the local scale (one specific pond or waterbody) because it is labour intensive and because of the practicalities with regard to organising such physical removal actions. The measure has been described by O’Keeffe (2009) and is applied on the local scale, such as small irrigation dams. No exact details are given on the size of the pond the measure was applied.</p>									
<p>Effectiveness of the measure Is it effective in relation to its objective? Has the measure previously worked, failed? Please select one of the categories of effectiveness (with an ‘X’), and provide a rationale, with supporting evidence and examples if possible.</p>	<p><i>Effectiveness of measures</i></p>	<p><i>Effective</i></p>	<input type="checkbox"/>	<p><i>Neutral</i></p>	<p><i>x</i></p>	<p><i>Ineffective</i></p>	<input type="checkbox"/>	<p><i>Unknown</i></p>	<input type="checkbox"/>	<p><i>Rationale:</i> O’Keeffe (2009) state that water body drainage is their preferred method (to eradicate the species from Queensland). However, this comes with a number of caveats, in that it can only be effectively undertaken on isolated water bodies with low conservation value, note that the measure undertaken by O’Keeffe (2009) resulted in the filling in of the drained water body.</p>
<p>Effort required</p>	<p>O’Keeffe (2009) reported that the approach could be completed in 1-5 days, depending on the size and complexity of the waterbody. Much depends on the local environmental conditions, the size of the waterbody, the density of <i>T. scripta</i> occurring,</p>									

<p>e.g. period of time over which measure needs to be applied to have results</p>	<p>the accessibility to the site, etc. Before draining water bodies, it is important to first secure sites with barrier fences and pitfall traps (O’Keeffe 2009). Pitfall traps are in fact large buckets that are placed in the soil similar to traps used for amphibians. When sliders migrate they will fall into the pits and cannot climb out of it. It is also important to provide good communication on why the species are caught, how they are caught and what is done with the animals once they are actually caught (this applies in fact to all eradication or control measures). The LIFE Emys project and several other projects provide a good qualitative estimate of the effort required to run such eradication campaigns, but do not focus on the draining of ponds.</p> <p>A range of local and environmental permissions would be required before such method could be used.</p>						
<p>Resources required¹ e.g. cost, staff, equipment etc.</p>	<p>The cost would vary depending mainly on the size of the waterbody, and whether (native) fish need to be removed to rescue them beforehand (capture the fish and translocate them). However, (personal communication with Peter Paul van Dijk mentioned in the report on <i>Chrysemys picta</i>, see Scalera et al. 2017) other techniques, such as those which foresee a combination of baited fyke traps and basking traps, may be more cost-efficient than draining a pond.</p>						
<p>Side effects (incl. potential) – both positive and negative i.e. positive or negative side effects of the measure on public health, environment including non-targeted species, etc.</p> <p>For each of the side effect types please select one of the impact categories (with an ‘X’), and provide a rationale, with supporting evidence and examples if possible.</p>	<p>Environmental effects</p>	<p>Positive</p>	<input type="checkbox"/>	<p>Neutral or mixed</p>	<input type="checkbox"/>	<p>Negative</p>	<p>x</p>
	<p>Social effects</p>	<p>Positive</p>	<input type="checkbox"/>	<p>Neutral or mixed</p>	<p>X</p>	<p>Negative</p>	<input type="checkbox"/>
	<p>Economic effects</p>	<p>Positive</p>	<input type="checkbox"/>	<p>Neutral or mixed</p>	<input type="checkbox"/>	<p>Negative</p>	<p>x</p>
	<p><i>Rationale:</i> Draining of a pond can have major negative effect on the local species (plants, macroinvertebrates, fish etc.) and should be assessed on beforehand if it outweighs the positive effects of removing <i>T. scripta</i>.</p>						
	<p>If it is a commercially important site, e.g. fish farm, the effect of draining can have a negative economic side effect.</p>						
	<p>No social side effects are reported in literature.</p>						
<p>Acceptability to stakeholders e.g. impacted economic activities, animal welfare considerations, public perception, etc.</p> <p>Please select one of the categories of acceptability (with an ‘X’), and provide a rationale, with supporting evidence and examples if possible.</p>	<p>Acceptability to stakeholders</p>	<p>Acceptable</p>	<input type="checkbox"/>	<p>Neutral or mixed</p>	<p>x</p>	<p>Unacceptable</p>	<input type="checkbox"/>
	<p><i>Rationale:</i> Experience in the northern and western European countries (Belgium, Flanders) has shown that the opinion of the public towards removal of the species is mixed (personal experience of the author, but see also Kuzmanova et al. 2018). The general perception of the species presence is often neutral or even positive and therefore public support for any type of eradication or management is low (Ficetola et al. 2012; personal experience of the author).</p>						
	<p>Teillac-Deschamps et al. (2008) state that upon asking the general public about their feelings on turtles, many people who spent time hiking commented that they liked seeing turtles during their walks. For some urban people, this exotic species is one of the few representations of nature to which they are exposed in urban parks.</p>						

	Many nature organisations are still in favour of removing alien species from nature reserves and are generally more positive towards the actions done to eradicate the species (Ficetola et al. 2012).								
<p>Additional cost information ¹</p> <p>When not already included above, or in the species Risk Assessment.</p> <ul style="list-style-type: none"> - implementation cost for Member States - the cost of inaction - the cost-effectiveness - the socio-economic aspects <p>Include quantitative &/or qualitative data, and case studies (incl. from countries outside the EU).</p>	No specific information on details of costs is available in literature.								
<p>Level of confidence on the information provided ²</p> <p>Please select one of the confidence categories along with a statement to support the category chosen. See <i>Notes</i> section at the bottom of this document.</p> <p>NOTE – this is not related to the effectiveness of the measure</p>	<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;"><i>Inconclusive</i></td> <td style="width: 5%;"></td> <td style="width: 25%;"><i>Unresolved</i></td> <td style="width: 5%;"><i>x</i></td> <td style="width: 25%;"><i>Established but incomplete</i></td> <td style="width: 5%;"></td> <td style="width: 25%;"><i>Well established</i></td> <td style="width: 5%;"></td> </tr> </table> <p><i>Rationale:</i> the measure has not been applied regularly or at a large scale according to literature. Therefore it is difficult to assess the level of confidence.</p>	<i>Inconclusive</i>		<i>Unresolved</i>	<i>x</i>	<i>Established but incomplete</i>		<i>Well established</i>	
<i>Inconclusive</i>		<i>Unresolved</i>	<i>x</i>	<i>Established but incomplete</i>		<i>Well established</i>			

<p>Rapid eradication for new introductions - Measures to achieve eradication <u>at an early stage of invasion</u>, after an early detection of a new occurrence (cf. Article 17). This section assumes that the species is not currently present in a Member State, or part of a Member State's territory. This table is repeated for each of the eradication measures identified.</p>	
<p>Measure description</p> <p>Provide a description of the measure, and identify its objective</p>	<p>Physical removal using traps and nets</p> <p>There are several methods used to capture <i>T. scripta</i> which are mentioned in several LIFE projects. For an overview of all methods that have been tested and used to capture <i>T. scripta</i>, refer to Sancho Alcayde et al. (2015). One popular (passive) method is the use of basking turtle traps (see also Surveillance table above). These are floating traps (with or without bait) that</p>

are often used for the sliders to bask (sunbathe) and that have been proven to be effective in capturing the species (Scalera 2006; Valdéon et al. 2010; Vogt 2012, LIFE Trachemys, 2012b; Foglini & Salvi 2017). Essentially, this trap is comprised of a floating 'cage' with a slippery inside frame from which turtles cannot climb out.

The sundeck turtle trap is a floating wire cage submerged and anchored (Vogt, 1980). The target turtle is attracted by a bait in the centre of the cage which can be reached by climbing a mesh vinyl coated wired ramp. The modified "Bolue" trap" is a floating trap consisting of a round platform, made of wood or cork. The turtles can be caught in a net as they attempt to climb over the platform. The "Bolue" trap was developed for capturing individuals for research (Valdeón et al. 2010), but has also been used to control *Trachemys scripta*, for example in Spain since 2010 (Valdeón et al. 2010). Another type of trap is the Aranzadi Turtle Trap (ATT), which is a modification of the "Sun Deck Turtle Trap" (Heinsohns Country Store 2009). In this case the metal grille ramp is replaced with cork plates on both sides of the trap. Cork plates have proven to be effective to census pond slider populations as turtles are attracted to this kind of substrate to bask (Valdeón et al. 2010).

With regard to the use of bait, research by Mali et al. (2014) has indicated that bait (fresh chicken entrails for red-eared sliders) can be used but that frequent replacement is necessary. In addition, they found that the success of capturing the species increased when they used dry dog food and dry cat food compared to traditional canned sardine bait. Trials in Flanders have indicated that there was no increased catching success when using canned cat food (personal observation of the author). However, Drost et al. (2011) found that ground or shredded cat food did not hold together and was more difficult to handle than whole sardines, and that (limited trials) canned sardines worked better than alternative baits.

Vogt (1979) found that painted turtles *Chrysemys picta* were enticed to enter traps baited with conspecifics in the early spring when these turtles were copulating but not yet feeding. This could be used for *T. scripta* as well, although it has not yet been tested according to literature.

In addition to the above mentioned traps, turtles can be trapped with a variety of nets and funnel-traps: minnow, seine, fyke, Cathedral, and crayfish traps (Fowler & Avery 1994; Bennett 1999; Gamble 2006; Sterrett et al. 2010; Brown et al. 2011; Vogt 2012; Polo-Cavia et al. 2012; Lascève 2014; LIFE Trachemys 2012b, d). The latter three devices are all funnel-type traps and as such should be set partially-submerged to avoid the captured animals drowning. In Australia, Cathedral traps are used in preference to basking traps which are difficult to transport and unsuitable for use in public or high visibility locations. Bait used in funnel traps can be placed either suspended near the funnel entrance or placed in bait containers deeper inside the trap (Vogt 2012). The disadvantage of these nets is that other species especially fish are caught as by catch and that they require very frequent checks (at least every 24 hours) which is very labor intensive (personal experience of the author, but see also Bugter et al. (2011) and Vogt (2012). However, any species of fish, crayfish, frogs, salamanders, sliders, birds, mammals etc., which may predate each other into the net or drawn, may be captured.

It is recommended to place the basking turtle traps early in the season (or during summer) for more northern European countries with distinct seasons (personal observation of the author). During winter, the species hibernate and are not active, but in spring they are very fond of basking. The spring and early summer are the periods when the highest catching success is

	<p>obtained (personal observation of the author). Vogt (2012) states that they are not adequate for routine sampling, because the turtles must become accustomed to the newly offered basking areas. In addition, it is important when placing these basking turtle traps that no other possible basking areas are in the neighborhood of the trap (for example fallen trees or branches) as these reduce the chance of catching the species via the trap. If possible and acceptable small basking areas can be made inaccessible or fallen trees can be removed (temporarily).</p>									
<p>Scale of application At what scale is the measure applied? What is the largest scale at which it has been successfully used? Please provide examples, with areas (km² or ha) if possible.</p>	<p>This method is often applied at the local scale (one specific pond or waterbody or one specific nature reserve) as it is labour intensive and due to the practicalities with regard to organising such physical removal actions and regular checks. For example, Drost et al. (2011) undertook a trapping campaign of <i>T. scripta</i> at Montezuma Well, a 112m diameter and 17m deep spring in Arizona, USA.</p> <p>Examples of the application can be found in France (Maurer 2015; Lescéve 2015; Carbone 2011) in Spain (Valdéron et al. 2010; LIFE Trachemys project) and in Corsica (Peinado et al. 2011). The scale of application ranges in size (from 17ha to 2,960 ha).</p>									
<p>Effectiveness of the measure Is it effective in relation to its objective? Has the measure previously worked, failed?</p> <p>Please select one of the categories of effectiveness (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="645 587 1906 651"> <tr> <td><i>Effectiveness of measures</i></td> <td><i>Effective</i></td> <td></td> <td><i>Neutral</i></td> <td>x</td> <td><i>Ineffective</i></td> <td></td> <td><i>Unknown</i></td> <td></td> </tr> </table> <p><i>Rationale:</i></p> <p>As a measure by itself, it is unlikely to eradicate a population. A vast amount of literature is available on the use of traps to capture the species, with many studies mentioning the mixed success of using the traps to reduce numbers of <i>T. scripta</i>.</p> <p>The results of a project in Corsica (Peinado et al. 2011) in an area of 168 ha indicated that fyke nets provided the best results irrespective of the type of environment and that the use of oil of Sardines (as bait) had a positive effect on the capture success. A high success rate of up to 80% of the individuals that were spotted, were caught. However they also mention that the success rate and effort required depends on the number of fykes used, the environmental conditions, etc.</p> <p>Drost et al. (2011) used trapping over two years (2007 & 2008) to remove <i>T. scripta</i> from a spring 112m diameter in Arizona, USA, however they only managed to remove most of the population over a two year period. They estimated that 3 individuals were remaining after the removal effort (from ca. 20 before hand), and recommended a continued trapping campaign (using basking traps) to be implemented to remove the remainder of the individuals. It is unknown if this was undertaken and therefore if eradication was successful, the species is still listed as 'present' on the US National Parks Service species lists for Montezuma Castle National Park but this is a much larger park than just Montezuma Well. They found that hoop nets (out of hoop nest, basking traps, hand, and dip net), were the most effecting at capturing <i>T. scripta</i> (71% of captures were through this method), followed by basking traps (21% of captures), during a removal campaign in Montezuma Well ecosystem, USA. However they also found that an advantage of the basking traps is that they are much less time intensive than the hoop nets.</p> <p>According to the LIFE Emys (Gili 2016) project prior to the start of the "eradication phase", a complete feasibility study should include:</p> <ul style="list-style-type: none"> • Estimation of abundance of alien animals 	<i>Effectiveness of measures</i>	<i>Effective</i>		<i>Neutral</i>	x	<i>Ineffective</i>		<i>Unknown</i>	
<i>Effectiveness of measures</i>	<i>Effective</i>		<i>Neutral</i>	x	<i>Ineffective</i>		<i>Unknown</i>			

	<ul style="list-style-type: none"> • Thorough physiography and sites accessibility analysis • Identification of threats <p>in order to reach or to target a complete removal (eradication)</p> <p>Where the above conditions are not met Gili (2016) suggests to:</p> <ul style="list-style-type: none"> • avoid captures from locations where eradication is not possible • prevent further releases with strong education plans and communication strategies
<p>Effort required e.g. period of time over which measure needs to be applied to have results</p>	<p>The effort required depends on the size of the area that is targeted, the density of occurrence of the species, the accessibility and therefore it is difficult to give an overall estimate of the effort that is required.</p> <p>In terms of effort needed for individual trap types, Drost et al. (2011) state that hoop nets require two separate trips and several hours to set them one day, and then check them the next. In contrast to basking traps, which are set out at the beginning of the season and operate continuously until they are retrieved in autumn, and only require a quick check to see if any turtles are captured. They also found that setting out hoop nets over 48 hours (rather than 24) did not increase capture total of <i>T. scripta</i> individuals.</p> <p>In terms of effort for eradication campaigns, below is an overview of different studies that mention the effort required.</p> <p>Vogt (2012) describes the use of a baited hoop trap and generally states that for this type of trap bait should be changed daily and traps checked at 4 to 8 hour intervals.</p> <p>The use of fyke nets has been tested in France in 3 different projects (Lascève 2014; Maurer 2015; Peinado et al. 2011).</p> <ul style="list-style-type: none"> - Lascève (2014) gives an estimate of the time and effort required based on their project performed in France. For the action performed in 2015 a total of 146 days effort was needed (2 people employed 73 days each). This resulted in a capture of 159 <i>Trachemys</i> individuals from a waterbody that was 350 ha. The action started in 2003 and still continued in 2018, indicating that long-term eradication or population control is needed. - Carbone (2011) also performed an action in France in the Mauguio basin (2,960 ha), where 133 alien turtles were caught over a period of 4 years (2010-2013), but it is unknown if this achieved eradication. - A study performed by Lambert et al. (2018) in the USA reported the capture of 180 individuals over 900 trapping nights using nets and supplemented with hand trapping without further details. - Within the LIFE <i>Trachemys</i> project (LIFE <i>Trachemys</i> 2012b) several methods to capture the turtles were tested including basking turtle traps. In total over two years 214 individuals were caught in Portugal (across 4 separate areas), whereas 13,870 individuals were caught in Valencia (25 areas). 18% of the individuals were caught using basking turtle traps. - Drost et al (2011) undertook a 2 year removal campaign (that removed most <i>T. scripta</i>) of <i>T. scripta</i> from Montezuma Well, a single spring 112m in diameter in Arizona USA. They had over 500 trap-days of effort using hoop nets and nearly 600 trap-days of effort with basking traps. Trapping effort with hoop nets averaged about 40 trap-days per month, ranging from 8 trap-days in March 2008 (a short, partial month) to 74 trap-days in July 2008.

Resources required¹
e.g. cost, staff, equipment etc.

Cost estimate of a turtle removal attempt for one particular Dutch wetland location (size not given) (Bugter et al. 2011):

- Estimated price per trap = € 150 (Sundeck traps are available for purchase from €152)
- Number of traps/action 5 = € 750 (Traps total)
- Labour per hour = € 70
- Trap placement 4 hours = € 280
- Trap checking 28 hours = € 1,960 (Two hours every day for two weeks)
- Organization 8 hours = € 560
- Transport 8 hours = € 560
- Trap removal 4 hours = € 280
- Trap cleaning and storage 4 hours = € 280
- Total labour: 56 hours = € 3,920
- **Total = € 4,670**

In addition to the above, the cost for euthanizing the species (on average 90 euro per species in Belgium, for one individual, probably cheaper if more than one is euthanized), if it cannot be brought to a refuge centre for wild animals, is needed.

Another project targeting the removal of alien *T. scripta* in France (Étang de Mauguio) estimated the average cost of removal per individual at 184 euros (including one technician, trapping devices and transportation cost). They caught 133 individuals over a period of 3 years using mainly fyke nets and not basking turtle traps (Carbonne 2011).

The project LIFE EMYS estimated the eradication cost at 55/euro per individual (Gili 2016).

Luiselli et al. (1997) mentioned that before such eradication campaign is considered a feasibility study should be performed. This obviously also comes with a cost, but can probably reduce the expenses on the long run.

Side effects (incl. potential) – both positive and negative
i.e. positive or negative side effects of the measure on public health, environment including non-targeted species, etc.

For each of the side effect types please select one of the impact categories (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.

<i>Environmental effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>		<i>Negative</i>	x
<i>Social effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>	X	<i>Negative</i>	
<i>Economic effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>		<i>Negative</i>	x

Rationale:
The environmental side effects can be negative as the traps and nets will also capture non-target native species (bycatch, e.g. any species of fish, crayfish, frogs, salamanders, sliders, birds, mammals etc. when using fykes for example). Negative side effects on the economic activities can exist if this is applied in a commercially important fish pond for example or if the nets/basking cages are destroyed/stolen. Social side effects are not reported in literature.

<p>Acceptability to stakeholders e.g. impacted economic activities, animal welfare considerations, public perception, etc.</p> <p>Please select one of the categories of acceptability (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="645 153 1888 220"> <tr> <td>Acceptability to stakeholders</td> <td><i>Acceptable</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td>x</td> <td><i>Unacceptable</i></td> <td></td> </tr> </table> <p><i>Rationale:</i> See the Rapid Eradication table <i>Physical removal via draining of the pond</i> above.</p>	Acceptability to stakeholders	<i>Acceptable</i>		<i>Neutral or mixed</i>	x	<i>Unacceptable</i>		
Acceptability to stakeholders	<i>Acceptable</i>		<i>Neutral or mixed</i>	x	<i>Unacceptable</i>				
<p>Additional cost information¹ When not already included above, or in the species Risk Assessment.</p> <ul style="list-style-type: none"> - implementation cost for Member States - the cost of inaction - the cost-effectiveness - the socio-economic aspects <p>Include quantitative &/or qualitative data, and case studies (incl. from countries outside the EU).</p>	<p>The idea has been given in a risk assessment survey in the Netherlands to include the removal of the species in the ongoing muskrat eradication programme (see Bugter et al. 2011) or other ongoing eradication programmes. This could reduce the costs considerably and allow to increase the scale of application.</p>								
<p>Level of confidence on the information provided²</p> <p>Please select one of the confidence categories along with a statement to support the category chosen. See <i>Notes</i> section at the bottom of this document.</p> <p>NOTE – this is not related to the effectiveness of the measure</p>	<table border="1" data-bbox="645 847 1928 914"> <tr> <td><i>Inconclusive</i></td> <td></td> <td><i>Unresolved</i></td> <td></td> <td><i>Established but incomplete</i></td> <td></td> <td><i>Well established</i></td> <td>x</td> </tr> </table> <p><i>Rationale:</i> There is a lot of literature available on the use of traps to catch <i>T. scripta</i> (see for example Vald�on et al. 2010, O'Keeffe 2009; Scalera 2006, Vogt 2012; LIFE Emys project and many other projects). There is a lot of information available on which trapping method yields the best results, how they should be placed and when and what is the effectiveness.</p>	<i>Inconclusive</i>		<i>Unresolved</i>		<i>Established but incomplete</i>		<i>Well established</i>	x
<i>Inconclusive</i>		<i>Unresolved</i>		<i>Established but incomplete</i>		<i>Well established</i>	x		

Rapid eradication for new introductions - Measures to achieve eradication at an early stage of invasion, after an early detection of a new occurrence (cf. Article 17). This section assumes that the species is not currently present in a Member State, or part of a Member State's territory. **This table is repeated for each of the eradication measures identified.**

<p>Measure description Provide a description of the measure, and identify its objective</p>	<p>Shooting Shooting has been used as a means of reducing <i>Trachemys</i> populations in ponds and lakes. This technique, however, has not been very effective in the USA (see http://icwdm.org/handbook/reptiles/Turtles.asp). According to a risk assessment study done in the Netherlands (Bugter et al. 2011) although turtles are quite shy and will easily flee, they do have to warm up in the sun making them quite visible and therefore, a potential target for shooting. However, shooting one will cause the others to flee and thus the efficiency in an area with many turtles is very low. Therefore shooting could be an option if just one or only a few turtles have to be removed urgently (Bugter et al. 2011).</p> <p>The measure has been tested on <i>T. scripta</i> in France (with mixed success) within the two projects “Tests de méthodes de gestion d’une population de Trachémyde à tempes rouges sur le plan d’eau du site de Courpain (Loiret)” (Maurer 2015) and “Opération de régulation d’une population de Trachémyde à tempes rouges sur le site des Vieux Salins d’Hyères (Var) (Lascève 2014).</p> <p>This method has also been tested within the LIFE Trachemys project (LIFE Trachemys 2012b). Within this project ammunition was selected in order to be able to shoot <i>T. scripta</i> within a distance between 20 to 120m. The turtles can be mainly target when sunbathing although they can also be shot when being present at the water surface to breathe.</p>									
<p>Scale of application At what scale is the measure applied? What is the largest scale at which it has been successfully used? Please provide examples, with areas (km² or ha) if possible.</p>	<p>This method can be applied at the local scale (one specific pond or waterbody) because it is labour intensive and because of the practicalities with regard to organising such physical removal actions. Maurer (2015) mentions that the measure was applied at the site “Courpain” (17 ha) during a test to eradicate <i>T. scripta</i> in this area.</p>									
<p>Effectiveness of the measure Is it effective in relation to its objective? Has the measure previously worked, failed? Please select one of the categories of effectiveness (with an ‘X’), and provide a rationale, with supporting evidence and examples if possible.</p>	<p>Effectiveness of measures</p>	<p>Effective</p>	<input type="checkbox"/>	<p>Neutral</p>	<input type="checkbox"/>	<p>Ineffective</p>	<p>X</p>	<p>Unknown</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>Rationale: Shooting has shown to have a limited success mainly because turtles are easily disturbed and only one individual at the time can be caught (Bugter et al. 2011). There has been some success with the measure in France (Maurer 2015) but the total number of individuals shot was low, therefore it was considered ineffective as an eradication measure.</p> <p>Within the LIFE Trachemys project (Sancho Alcaide et al. 2015) the method was considered effective only for removing larger (adult) individuals at low density, provided that the shooter is well-experienced.</p>										

Effort required e.g. period of time over which measure needs to be applied to have results	There are no detailed quantitative data available on the effort that is required. There is a description made in Maurer (2015) mentioning that two people tried to shoot alien terrapins occurring at the Courpain site (17ha) and that 2 <i>T. scripta</i> individuals were shot in 2 hours. However, visiting a site several times and ambushing the species will require significant time and effort.						
Resources required ¹ e.g. cost, staff, equipment etc.	<p>A risk assessment study made in Belgium (Verwaijen 2016) gave a cost calculation for the weapon that is needed (300-4,000 euro) and the cost for ammunition (40-140 euro for 250 bullets) but no further details on the cost calculation were given in this study.</p> <p>Sancho Alcayde et al. (2015) mention that the equipment used in the project has had a cost of 2,549 euros (rifle, holster, mount, visor and ammunition -200 projectiles). Bullets are relatively expensive, at around 70 euros for a box of 20 units.</p>						
Side effects (incl. potential) – both positive and negative i.e. positive or negative side effects of the measure on public health, environment including non-targeted species, etc. For each of the side effect types please select one of the impact categories (with an ‘X’), and provide a rationale, with supporting evidence and examples if possible.	<i>Environmental effects</i>	<i>Positive</i>	<input type="checkbox"/>	<i>Neutral or mixed</i>	<input type="checkbox"/>	<i>Negative</i>	x
	<i>Social effects</i>	<i>Positive</i>	<input type="checkbox"/>	<i>Neutral or mixed</i>	<input type="checkbox"/>	<i>Negative</i>	x
	<i>Economic effects</i>	<i>Positive</i>	<input type="checkbox"/>	<i>Neutral or mixed</i>	X	<i>Negative</i>	<input type="checkbox"/>
	<p><i>Rationale:</i> The use of firearms can have negative environmental effects through the disturbance of local fauna (e.g. breeding water birds) and can also disturb or restrict human activities during operations (Sancho Alcayde et al. 2015).</p>						
Acceptability to stakeholders e.g. impacted economic activities, animal welfare considerations, public perception, etc. Please select one of the categories of acceptability (with an ‘X’), and provide a rationale, with supporting evidence and examples if possible.	Acceptability to stakeholders	<i>Acceptable</i>	<input type="checkbox"/>	<i>Neutral or mixed</i>	x	<i>Unacceptable</i>	<input type="checkbox"/>
Additional cost information ¹ When not already included above, or in the species Risk Assessment. - implementation cost for Member States - the cost of inaction	No detailed extra information on the cost for this specific measure is available in literature.						

<p>- the cost-effectiveness - the socio-economic aspects</p> <p>Include quantitative &/or qualitative data, and case studies (incl. from countries outside the EU).</p>									
<p>Level of confidence on the information provided ²</p> <p>Please select one of the confidence categories along with a statement to support the category chosen. See <i>Notes</i> section at the bottom of this document.</p> <p>NOTE – this is not related to the effectiveness of the measure</p>	<p><i>Inconclusive</i></p>		<p><i>Unresolved</i></p>		<p><i>Established but incomplete</i></p>	<p>x</p>	<p><i>Well established</i></p>		<p><i>Rationale:</i> As mentioned in literature the method exists but it is not widely used for this species.</p>

<p>Rapid eradication for new introductions - Measures to achieve eradication <u>at an early stage of invasion</u>, after an early detection of a new occurrence (cf. Article 17). This section assumes that the species is not currently present in a Member State, or part of a Member State’s territory. This table is repeated for each of the eradication measures identified.</p>	
<p>Measure description Provide a description of the measure, and identify its objective</p>	<p>Physical removal via angling Turtles can be captured by hook and line (e.g. Fowler & Avery 1994; Davis 1976, LIFE Trachemys project 2012b; Sancho Alcayde et al. 2015).</p> <p>According to Davis (1976) turtles can be captured through a fish line equipped with cans. Any size small cans can be used, but soft drink cans work best. The author suggests to remove the entire top of the can and punch a small hole in the bottom. Thread the fishing line through the can with the open end down. Tie a treble hook on the line and bait it with pieces of fish or other meat. Drop the hook into the water and fasten the other end of the line to a pole, tree or stout root. Adjust the length of the string so that the hook will be just below the water surface for catching slider turtles. The can will slip down over the bait and protect it from fish. Turtles will stick their heads up into the can and get the bait and the hook.</p> <p>The angling method has been tested in Spain within the LIFE Trachemys project (LIFE09 NAT/E/0000529) (Sancho Alcayde et al. 2015). The authors first tried to lure the species with bait (meat) and then placed an angling hook in front of the turtles to try and catch them. This method required trial and corrective measures to address error, and it is mainly considered to be useful in</p>

	<p>urban environments. Specific details (such as the type of wire and the type of hook) on the angling gear used can be found in the document “Ensayos de efectividad de medios de captura. Año 2012” of the LIFE Trachemys project (LIFE Trachemys 2012b, Sancho Alcayde et al. 2015). In the study they used a Savagegear rod Salt 8 "and 10-30 g of action, with a small reel Tubertini Vertigo (size 2,500) with 100 m of line braided fused Stren Microfuse of 0'08 mm, to which a piece of heavy monofilament bass is knotted (60 cm 0'40 mm) yellow, for easy viewing.</p>									
<p>Scale of application At what scale is the measure applied? What is the largest scale at which it has been successfully used? Please provide examples, with areas (km² or ha) if possible.</p>	<p>This can be done at the scale of a small local pond as described in literature (see LIFE Trachemys website, Sancho Alcayde et al. 2015).</p>									
<p>Effectiveness of the measure Is it effective in relation to its objective? Has the measure previously worked, failed? Please select one of the categories of effectiveness (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="645 587 1906 651"> <tr> <td><i>Effectiveness of measures</i></td> <td><i>Effective</i></td> <td></td> <td><i>Neutral</i></td> <td></td> <td><i>Ineffective</i></td> <td>X</td> <td><i>Unknown</i></td> <td></td> </tr> </table> <p><i>Rationale:</i> There is a description in Davis (1976) mentioning that the method is effective at catching individuals but it is time consuming. The LIFE Trachemys project mentions that the method could work mainly in an urban environment but that it requires several trials to capture the species. Therefore they score the measure as medium effectiveness since it mainly targets individuals that are accustomed to people passing and mainly larger individuals (Sancho Alcayde et al. 2015). Complete eradication using this method is unlikely and the method can mainly be sued for population reduction.</p>	<i>Effectiveness of measures</i>	<i>Effective</i>		<i>Neutral</i>		<i>Ineffective</i>	X	<i>Unknown</i>	
<i>Effectiveness of measures</i>	<i>Effective</i>		<i>Neutral</i>		<i>Ineffective</i>	X	<i>Unknown</i>			
<p>Effort required e.g. period of time over which measure needs to be applied to have results</p>	<p>The LIFE Trachemys project mentions that the skills needed are high, therefore it is expected that the effort needed is high as well and that the time needed can quickly increase depending on the skills of the angler, the access to the site. . In 2013 a single person captured 851 exotic turtles in all kinds of environments in 103 hours of dedicated effort (Sancho Alcayde et al. 2015), which is still acceptable in terms of invested cost per captured individual. However, no details are given on the skills of the person, the density of the turtles occurring, the accessibility of the site, etc.</p>									
<p>Resources required¹ e.g. cost, staff, equipment etc.</p>	<p>A breakdown of costs of the equipment required is provided by Sancho Alcayde et al. (2015). The total budget needed for the equipment used is about 169 euros per season (with a useful life of 4 years for the fishing equipment (rod and reel), and a fixed annual cost in replacement of threads, ballasts and hooks).</p> <ul style="list-style-type: none"> • Cane: 100 euros (useful life for at least 4 campaigns if the handling is adequate). • Reel: 40 euros (useful life 4 campaigns if the handling is appropriate). • Braided line 0'08-0'10 mm (at least 300 m for one season): 50 euros. • Triples (about 5 packages of 20-25 units per season): 50 euros. • Low 0.40 mm (yellow monofilament line, 100 meters for 4 seasons): 3 euros. • Ballasts 5 g (20 per season): 12 euros (lead), 50 euros (tungsten). • TOTAL SEASON (calculation to 4 years): ca. 169 euros. 									

<p>Side effects (incl. potential) – both positive and negative i.e. positive or negative side effects of the measure on public health, environment including non-targeted species, etc.</p> <p>For each of the side effect types please select one of the impact categories (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="640 183 1888 288"> <tr> <td><i>Environmental effects</i></td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td>X</td> <td><i>Negative</i></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><i>Social effects</i></td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td>X</td> <td><i>Negative</i></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><i>Economic effects</i></td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td>X</td> <td><i>Negative</i></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p><i>Rationale:</i> no information is given on the side effects in literature, however it is possible that native turtle species could also be caught.</p>								<i>Environmental effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>	X	<i>Negative</i>					<i>Social effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>	X	<i>Negative</i>					<i>Economic effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>	X	<i>Negative</i>				
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<p>Acceptability to stakeholders e.g. impacted economic activities, animal welfare considerations, public perception, etc.</p> <p>Please select one of the categories of acceptability (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="640 592 1888 655"> <tr> <td><i>Acceptability to stakeholders</i></td> <td><i>Acceptable</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td>x</td> <td><i>Unacceptable</i></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p><i>Rationale:</i> In addition to stakeholder perceptions to eradication measures in general (see the Rapid Eradication table <i>Physical removal via draining of the pond</i> above, this measure raises welfare concerns (e.g. ingested fish hooks) which would reduce its acceptability and may raise concern from the public (Davis 1976).</p>								<i>Acceptability to stakeholders</i>	<i>Acceptable</i>		<i>Neutral or mixed</i>	x	<i>Unacceptable</i>																								
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<p>Level of confidence on the information provided²</p>	<table border="1" data-bbox="640 1291 1928 1355"> <tr> <td><i>Inconclusive</i></td> <td></td> <td><i>Unresolved</i></td> <td></td> <td><i>Established but incomplete</i></td> <td>x</td> <td><i>Well established</i></td> <td></td> <td></td> <td></td> </tr> </table> <p><i>Rationale:</i></p>								<i>Inconclusive</i>		<i>Unresolved</i>		<i>Established but incomplete</i>	x	<i>Well established</i>																							
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<p>Please select one of the confidence categories along with a statement to support the category chosen. See <i>Notes</i> section at the bottom of this document.</p> <p>NOTE – this is not related to the effectiveness of the measure</p>	<p>Besides a short notice by Fowler & Avery (1994) and the description in Davis (1976) there is a short description available in the document “Ensayos de efectividad de medios de captura. Año 2012” of the LIFE Trachemys project and a description in Sancho Alcayde et al. (2015).</p>
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Rapid eradication for new introductions - Measures to achieve eradication <u>at an early stage of invasion</u> , after an early detection of a new occurrence (cf. Article 17). This section assumes that the species is not currently present in a Member State, or part of a Member State’s territory. This table is repeated for each of the eradication measures identified.										
<p>Measure description Provide a description of the measure, and identify its objective</p>	<p>Physical removal via hand (dip-net, or snorkelling) Vogt (2012) describes that basking aquatic turtles can often be captured by hand or dipnet if approached underwater or from the rear. Investigators traveling by boat can rush basking turtles at full speed and often pluck them off a log or sweep them into a dipnet. Another way of catching them by hand is by diving or snorkelling. Muddling or noodling for turtles in shallow water involves feeling for them in the mud, the nooks and crannies below logs, snags, rocks, and under overhanging banks. Such haphazard methods of capturing turtles suffice for locality documentation but are generally inappropriate for eradication (or quantitative sampling). Investigators working in a closed system, such as a small pond, can perhaps capture all of the turtles present by muddling (Vogt 2012).</p> <p>The method using a hand-net has been briefly described in the LIFE Trachemys project (LIFE09 NAT/E/0000529) (Sancho Alcayde et al. 2015) where they mention that a hand-net could be used to capture juveniles which cannot dive yet or even adults if you are able to surprise them.</p>									
<p>Scale of application At what scale is the measure applied? What is the largest scale at which it has been successfully used? Please provide examples, with areas (km² or ha) if possible.</p>	<p>The capture by hand is described for some species of turtles by Vogt (2012) mainly in tropical regions and is shortly mentioned from the LIFE Trachemys project in Spain. There are no specific details available in literature on the scale of this method.</p>									
<p>Effectiveness of the measure</p>	<table border="1"> <tr> <td data-bbox="629 1289 927 1390"><i>Effectiveness of measures</i></td> <td data-bbox="927 1289 1133 1390"><i>Effective</i></td> <td data-bbox="1133 1289 1189 1390"></td> <td data-bbox="1189 1289 1375 1390"><i>Neutral</i></td> <td data-bbox="1375 1289 1435 1390">X</td> <td data-bbox="1435 1289 1621 1390"><i>Ineffective</i></td> <td data-bbox="1621 1289 1680 1390"></td> <td data-bbox="1680 1289 1848 1390"><i>Unknown</i></td> <td data-bbox="1848 1289 1906 1390"></td> </tr> </table>	<i>Effectiveness of measures</i>	<i>Effective</i>		<i>Neutral</i>	X	<i>Ineffective</i>		<i>Unknown</i>	
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<p>Is it effective in relation to its objective? Has the measure previously worked, failed?</p> <p>Please select one of the categories of effectiveness (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<p><i>Rationale:</i> As described in Vogt (2012) the method can be effective at capturing individuals but depends on the species, the location, the training of the person trying to catch the species. The document “Guía metodológica para la captura y manejo de galápagos” briefly mentions the use of this method (LIFE Trachemys 2012a), as do Sancho Alcayde et al. (2015).</p> <p>The skills needed are, according to the test within the LIFE Trachemys project performed in Spain, rather low, but the effectiveness is scored as ‘neutral’ (Sancho Alcayde et al. 2015). It is likely to be more effective in situations where animals have difficulty to escape (during droughts, or in suddenly emptied ponds and pools) or when turtles show some confidence and tolerance in human presence (e.g. peri-urban environments) (Sancho Alcayde et al. 2015).</p>																											
<p>Effort required e.g. period of time over which measure needs to be applied to have results</p>	<p>Vogt (2012) describes the technique as “not very efficient” as it can take, for certain species under certain circumstances between 20 and 30 minutes to catch an individual. In a project in the Pego-Oliva marsh, a maximum catchability was obtained with an average of up to 25 individuals/person, with up to 180 specimens removed in one morning in a portion of ditch (Sancho Alcayde et al. 2015).</p>																											
<p>Resources required¹ e.g. cost, staff, equipment etc.</p>	<p>Sancho Alcayde et al. (2015) mention that the cost for a hand-net is low, 30-60 Euros.</p>																											
<p>Side effects (incl. potential) – both positive and negative i.e. positive or negative side effects of the measure on public health, environment including non-targeted species, etc.</p> <p>For each of the side effect types please select one of the impact categories (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="645 655 1888 759"> <tr> <td><i>Environmental effects</i></td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td></td> <td><i>Negative</i></td> <td>x</td> </tr> <tr> <td><i>Social effects</i></td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td>X</td> <td><i>Negative</i></td> <td></td> </tr> <tr> <td><i>Economic effects</i></td> <td><i>Positive</i></td> <td></td> <td><i>Neutral or mixed</i></td> <td>X</td> <td><i>Negative</i></td> <td></td> </tr> </table> <p><i>Rationale:</i> There are side effects related to this measure, for example disturbance of native species, but also wading through the mud can have an effect on the water quality and thus on other species occurring in the habitat.</p>							<i>Environmental effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>		<i>Negative</i>	x	<i>Social effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>	X	<i>Negative</i>		<i>Economic effects</i>	<i>Positive</i>		<i>Neutral or mixed</i>	X	<i>Negative</i>	
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<i>Acceptability to stakeholders</i>	<i>Acceptable</i>		<i>Neutral or mixed</i>	X	<i>Unacceptable</i>																							
<p>Additional cost information¹</p>	<p>No detailed extra information could be found for this method.</p>																											

<p>When not already included above, or in the species Risk Assessment.</p> <ul style="list-style-type: none"> - implementation cost for Member States - the cost of inaction - the cost-effectiveness - the socio-economic aspects <p>Include quantitative &/or qualitative data, and case studies (incl. from countries outside the EU).</p>									
<p>Level of confidence on the information provided²</p> <p>Please select one of the confidence categories along with a statement to support the category chosen. See <i>Notes</i> section at the bottom of this document.</p> <p>NOTE – this is not related to the effectiveness of the measure</p>	<i>Inconclusive</i>		<i>Unresolved</i>		<i>Established but incomplete</i>	x	<i>Well established</i>		
	<p><i>Rationale:</i></p> <p>There is a description of the method and a few examples given for turtles (not for <i>T. scripta</i> specifically) in Vogt (2012). The method has been tested within the LIFE Trachemys project (LIFE09 NAT/E/0000529) and is assessed on its effectiveness, but it is not clear at how many locations this was tested (LIFE Trachemys website; Sancho Alcayde et al. 2015).</p>								

<p>Management - Measures to achieve management of the species once it has become widely spread within a Member State, or part of a Member State's territory. (cf. Article 19), i.e. not at an early stage of invasion (see Rapid eradication table above). These measures can be aimed at eradication, population control or containment of a population of the species. This table is repeated for each of the management measures identified.</p>	
<p>Measure description</p> <p>Provide a description of the measure, and identify its objective</p>	<p>Integrated control management</p> <p>In order to manage established populations of the species, a combination of the rapid eradication measures described above can be used depending on the specific circumstances. The choice of management aim, eradication, control or containment, depends upon the size of the water body, the number of individuals, the connectivity with other water bodies, etc. See the above rapid eradication tables for details on the separate measures. For containment of small populations within a specified area fencing seems to be the most appropriate approach (see Prevention of secondary spread table on <i>Fencing of public waterbodies</i> above).</p>

	<p>Several projects provide examples of how to manage populations in the wild. For example the LIFE Emys project, the LIFE Trachemys project (LIFE Trachemys 2012a, b, c, 2013; Sancho Alcayde et al. 2015) and several other projects performed in France (Lascève 2014; Maurer 2015), Corsica (Peinado et al. 2012), but also Spain (Valdéron et al. 2010) and Italy (Zanetti 2018).</p> <p>The LIFE Emys project (Gili 2016) stated that a good evaluation on the feasibility of the project before the start needs to be performed. In addition mathematical models (e.g. habitat suitability models or ecological niche models) can be applied to prioritize areas where management actions need to be focused on (Ficetola et al. 2009).</p> <p>There are several options to deal with the individuals captured and removed from the wild. One of the methods is to euthanize the animals. Another option is to place the animals within rescue centres or zoos or to release them in semi-natural environments such as quarries. The disposal of live specimens at rescue centres and zoological gardens, as reported for Italy, Spain, and France (Scalera 2006) is a measure that could provide a solution which prevents to euthanizing the animals. Also the LIFE Emys project (Gili 2016) implemented this kind of measure and coupled an educational aspect to this. This is also implemented in Flanders (Belgium) where an agreement has been made between the province of East-Flanders and several rescue centres to take care of the live specimens that are caught (personal experience of the author). In some cases private pet owners can also take care of the specimens if an official agreement with them is made and if the proper measures are taken to avoid secondary dispersal.</p>									
<p>Scale of application At what scale is the measure applied? What is the largest scale at which it has been successfully used? Please provide examples, with areas (km² or ha) if possible.</p>	<p>The scale of application depends on the resources available, and the management aims across the sites identified for management. Some sites may be suitable for eradication, and others for control or containment. In terms of effectiveness, measures with the aim of control will be more likely to be applied across a larger area than eradication.</p> <p>For details and examples, see the separate rapid eradication tables. The scale of application ranges from a small urban pond through large nature areas.</p>									
<p>Effectiveness of the measure Is it effective in relation to its objective? Has the measure previously worked, failed?</p> <p>Please select one of the categories of effectiveness (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1" data-bbox="645 979 1888 1043"> <tr> <td><i>Effectiveness of measures</i></td> <td><i>Effective</i></td> <td></td> <td><i>Neutral</i></td> <td>X</td> <td><i>Ineffective</i></td> <td></td> <td><i>Unknown</i></td> <td></td> </tr> </table> <p><i>Rationale:</i> In terms of population control there is evidence that physical removal measures can be effective at individual sites or isolated waterbodies. However the effectiveness across a large geographic scale is currently unknown, and is likely to be much harder to achieve, and potentially impossible. The same can be said also for eradication and containment. The local environmental conditions and the size of the population determine the effectiveness of the measure.</p> <p>Examples of effectiveness described for different methods applied within different projects can be found in the rapid eradication tables above. A good overview on the different physical passive and active removal methods and their effectiveness can be found in Sancho Alcayde et al. (2015).</p>	<i>Effectiveness of measures</i>	<i>Effective</i>		<i>Neutral</i>	X	<i>Ineffective</i>		<i>Unknown</i>	
<i>Effectiveness of measures</i>	<i>Effective</i>		<i>Neutral</i>	X	<i>Ineffective</i>		<i>Unknown</i>			

	<p>A good example of a project trying to manage the reduction or control of <i>Trachemys</i> and at the same time restore the native populations is the LIFE project Trachemys. A significant amount of progress was achieved and evidence from the project's seven locations showed that at:</p> <ul style="list-style-type: none"> • Peñíscola marshes - a reduction in the number of captures of exotic turtles was observed, while catches of native species (especially <i>Mauremys</i>) increased; • Almenara marshlands - continued efforts to remove <i>T. scripta</i> specimens and to destroy nests of this species was reflected in the low number of juveniles present and, therefore, in a reduction in the capture of exotic turtles; • Marjal dels Moros – numbers of catches of exotic species stabilized or fell. A mixed nesting area of <i>Emys</i>, <i>Mauremys</i> and <i>T. scripta</i> was detected which is under surveillance and control. The populations of native turtles were found to be in good condition with signs of recovery (increase of nests and juveniles); • Marsh of Rafalell i Vistabella – monitoring work successfully verified the reproduction of <i>Emys</i> that had been reintroduced; • P. N. L'Albufera - biodiversity has increased in the Natural Park thanks to reintroduction works by action C8 (Provision of Services to participate in the implementation of the captive breeding program of Cyprus grass snake <i>Natrix natrix cypriaca</i>, Cypriot dendrogalias <i>Hierophis cypriensis</i> and freshwater turtle <i>Mauremys rivulata</i>) (Tancat de la Pipa and Tancat de Milia); • Albufera Gaianes - the population of exotic turtles (mainly <i>T. scripta</i>) has been reduced and the reintroduction of <i>Mauremys</i> has started; • Portugal – four sites were expected to benefit in the medium term from eradication work targeting exotic turtles. Problems still existed with <i>T. scripta</i> reproduction, but the number of nests, juveniles and adults was low.
<p>Effort required e.g. period of time over which measure needs to be applied to have results</p>	<p>See the rapid eradication tables above in relation to effort for individual measures, but in summary the effort required depends again on the aims that are set and on the area, size of the waterbody, number of individuals that are targeted. It is expected that the effort required to manage established populations (e.g. population control, eradication, or containment across many sites) will be relatively high due to human resources needed (e.g. for setting and checking traps) and the fact that the measures will need to be in place permanently (or repeated on a regular basis).</p>
<p>Resources required¹ e.g. cost, staff, equipment etc.</p>	<p>See the rapid eradication tables above in relation to effort for individual measures with the aim of eradication at small isolated sites. If the aim of management is the control across a larger landscape, a combination of the methods could be used, selected based on individual site conditions, including fencing of ponds to keep them in a contained environment.</p> <p>Although there are no detailed cost calculations available in literature on the costs of each type of approach there are general numbers on the budget available for different projects</p>

	<p>For the LIFE Emys project (Italy)⁸ the total project cost was € 1,053,472 (Gili 2016). The project ran for 3 years and included slider removal from two sites, establishment of a reproduction and reintroduction programme for the native turtle <i>Emys orbicularis</i>, and public outreach.</p> <p>For the LIFE Trachemys project the total budget was 1,200,754 €. The project ran 3 years and focused on eradicating slider populations from 17 wetland sites in Valencia and Portugal and public outreach activities (see effectiveness section above)⁹.</p> <p>Regarding the keeping of the animals within rescue centres or zoos the LIFE Emys project (After Life Conservation Plan) gives an estimate of 30,000 Euro for keeping all captured individuals for a period of 3 years.</p>												
<p>Side effects (incl. potential) – both positive and negative i.e. positive or negative side effects of the measure on public health, environment including non-targeted species, etc.</p> <p>For each of the side effect types please select one of the impact categories (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1"> <tr> <td>Environmental effects</td> <td>Positive</td> <td></td> <td>Neutral or mixed</td> <td>x</td> <td>Negative</td> <td></td> </tr> </table>	Environmental effects	Positive		Neutral or mixed	x	Negative				x		
Environmental effects	Positive		Neutral or mixed	x	Negative								
	Positive		Neutral or mixed	x	Negative								
	Positive		Neutral or mixed	x	Negative								
<p>Acceptability to stakeholders e.g. impacted economic activities, animal welfare considerations, public perception, etc.</p> <p>Please select one of the categories of acceptability (with an 'X'), and provide a rationale, with supporting evidence and examples if possible.</p>	<table border="1"> <tr> <td>Acceptability to stakeholders</td> <td>Acceptable</td> <td></td> <td>Neutral or mixed</td> <td>x</td> <td>Unacceptable</td> <td></td> </tr> </table>	Acceptability to stakeholders	Acceptable		Neutral or mixed	x	Unacceptable				x		
Acceptability to stakeholders	Acceptable		Neutral or mixed	x	Unacceptable								
<p>Additional cost information¹</p>	<p>There are no further detailed data available on the cost of the management measures specifically applicable for <i>T. scripta</i> than the ones already reported above.</p>												

⁸ LIFE Emys <http://www.lifeemys.eu/en/>

⁹ LIFE Trachemys http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=3821

<p>When not already included above, or in the species Risk Assessment.</p> <ul style="list-style-type: none"> - implementation cost for Member States - the cost of inaction - the cost-effectiveness - the socio-economic aspects <p>Include quantitative &/or qualitative data, and case studies (incl. from countries outside the EU).</p>									
<p>Level of confidence on the information provided²</p> <p>Please select one of the confidence categories along with a statement to support the category chosen. See <i>Notes</i> section at the bottom of this document.</p> <p>NOTE – this is not related to the effectiveness of the measure</p>	<i>Inconclusive</i>		<i>Unresolved</i>		<i>Established but incomplete</i>	x	<i>Well established</i>		
	<p><i>Rationale:</i> There have been ca. a dozen of projects such as the LIFE Emys and LIFE Trachemys projects setting up an entire management action for established populations including removal of the species, introduction of native species and setting up a communication campaign. However, the number of projects, especially in more northern or eastern EU member states with regard to alien <i>T. scripta</i> seems to be limited. One study was found on measures to limit <i>Trachemys scripta elegans</i> invasion in Latvia (Pupins & Čeirāns 2019).</p>								

<p>Bibliography³</p> <p>See guidance section</p>
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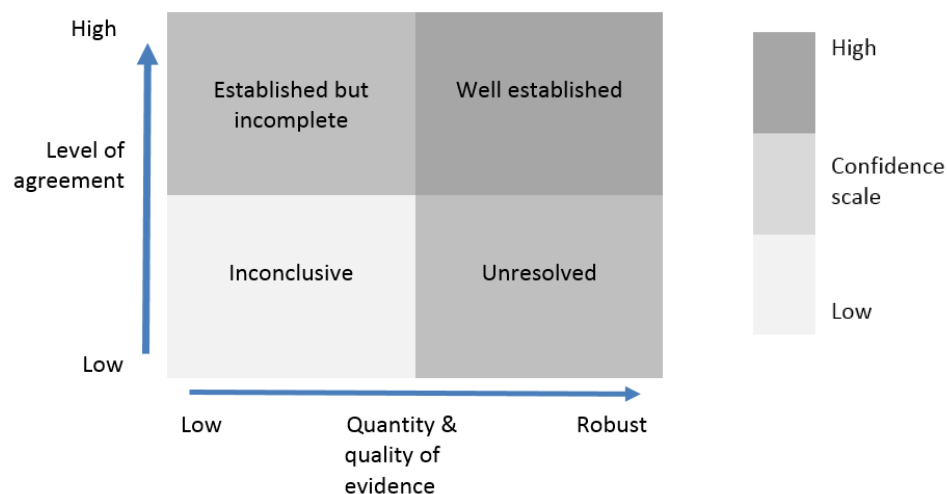
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Notes

1. Costs information. The assessment of the potential costs shall describe those costs quantitatively and/or qualitatively depending on what information is available. This can include case studies from across the Union or third countries.

2. Level of confidence¹⁰: based on the quantity, quality and level of agreement in the evidence.



- **Well established:** comprehensive meta-analysis¹¹ or other synthesis or multiple independent studies that agree.
- **Established but incomplete:** general agreement although only a limited number of studies exist but no comprehensive synthesis and/or the studies that exist imprecisely address the question.
- **Unresolved:** multiple independent studies exist but conclusions do not agree.
- **Inconclusive:** limited evidence, recognising major knowledge gaps

3. Citations and bibliography. The APA formatting style for citing references in the text and in the bibliography is used.

e.g. Peer review papers will be written as follows:

In text citation: (Author & Author, Year)

In bibliography: Author, A. A., & Author, B. B. (Publication Year). Article title. *Periodical Title*, Volume(Issue), pp.-pp.

(see <http://www.waikato.ac.nz/library/study/referencing/styles/apa>)

¹⁰ Assessment of confidence methodology is taken from IPBES. 2016. Guide on the production and integration of assessments from and across all scales (IPBES-4-INF-9), which is adapted from Moss and Schneider (2000).

¹¹ A statistical method for combining results from different studies which aims to identify patterns among study results, sources of disagreement among those results, or other relationships that may come to light in the context of multiple studies.