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**Supplementary table 1:** Regulations and notices published in South Africa’s Government Gazette in terms of the National Environmental Management: Biodiversity Act (NEM:BA), Alien and Invasive Species (A&IS) Regulations and Lists

Each entry in the lists is taken to be a taxon, noting some entries are at the subspecific, others above the species level (e.g. genus or family), in some cases broader non-taxonomic entities are listed (e.g. all hybrids between native and alien species of particular groups), and the link to a taxonomic backbone is not always clear. The 2020 lists were checked against various taxonomic backbones [for details see Wilson (2024)]. The actual documents are available from the Government Gazette, with copies stored in a zip file at <https://dx.doi.org/10.5281/zenodo.8176920> (SANBI, 2023). Additional lists outlining which types of taxa that are exempted from regulation were published. The number of regulated taxa as of 1 March 2021 is given as 566 on the regulations themselves but is taken in the main manuscript to be 560 as: two taxa—*Psidium x durbanensis* Baijnath ined. and *Python natalensis x Python molurus*—are not listed as valid taxa in relevant taxonomic databases or according to taxonomic experts consulted on the groups; grass carp and triploid grass carp are listed as two separate entities, although as the same scientific name is used [*Ctenopharyngodon idella* (Valenciennes, 1844)] they are considered here as one taxon; the genera *Pygocentrus* and *Rooseveltiella* (piranhas) are both listed although the latter is a synonym of the former according to GBIF.org and so has been collapsed; the taxa '*Rubus cuneifolius* Pursh and hybrid *R. x proteus* C.H.Stirt' are regulated as one listing, but are considered separate taxa here; the listing '*Salvinia molesta* D.S.Mitch. and other species of the Family Salviniaceae' is considered here to be two different listings, one at the species and the other at the family level; and there are four listings of hybrids between native and alien species of amphibians, birds, mammals, and reptiles (such listing are not for any specific taxon but rather a general listing if such taxa arise).

Date	# taxa regulated	# taxa 'invasive'	# taxa 'prohibited'	Description and notes (in particular, changes from the previous version)	Suggested citation(s)
17 Sep 2007 (DRAFT)	511	162	349	<p>Draft regulations, maps, and lists. Maps in Annexure of 'natural distribution ranges of indigenous species'. The maps were presented at a municipality level for 46 taxa of primates and other terrestrial mammals. These maps were intended to allow native populations to be distinguished from native-alien and extra-limital populations. To date this was the only time maps were published as part of the NEM:BA A&amp;IS Regulations &amp; Lists.</p> <ul style="list-style-type: none"> <li>• No listing categories (other than invasive species and prohibited invasive species)</li> <li>• No exemptions or prohibitions</li> <li>• No taxon authorities included</li> <li>• Alternative species names (i.e. ~synonyms) included for 140 taxa</li> <li>• The lists are mostly in alphabetical order, but not strictly (cf. 'marine others' and 'vascular plants')</li> <li>• 15 taxa were included in these lists but not in any future lists, including the prohibition of four genera of wallabies and kangaroos and five species of <i>Carex</i>.</li> <li>• <i>Caulerpa taxifolia</i> was listed as both a prohibited marine and a prohibited plant in these and the 2009 and 2013 draft lists (counted as one here)</li> <li>• <i>Ipomoea indica</i> was listed twice (counted as one here).</li> <li>• <i>Macrochelys temminckii</i> and its synonym <i>Chelydra macrochelys</i> are listed as separate entities (counted as one here)</li> <li>• <i>Salvinia biloba</i> and its synonym <i>Salvinia herzogii</i> are listed as separate entities (counted as one here)</li> </ul>	<p>Department of Environmental Affairs and Tourism (2007) National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) Draft Alien and Invasive Species Regulations, 2007. Government Gazette, notice 1146 of 2007, no. 30293, 17 September 2007, Pretoria, 3–71 pp.</p> <p>Department of Environmental Affairs and Tourism (2007) National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) Draft lists of exempted alien species, prohibited alien species and invasive species for which a permit is required under certain circumstances. Government Gazette, notice 1147 of 2007, no. 30293, 17 September 2007, Pretoria, 72–99 pp.</p>

Date	# taxa regulated	# taxa 'invasive'	# taxa 'prohibited'	Description and notes (in particular, changes from the previous version)	Suggested citation(s)
3 April 2009 (DRAFT)	1122	548	575	<p>Draft regulations and lists. The lists promulgated late in 2014 were largely the same as these lists</p> <ul style="list-style-type: none"> <li>• Includes definitions of which types of taxa or organisms are exempt (entitled 'List 1'), in essence those that are dead or were legally introduced and not otherwise listed</li> <li>• A separate list included for ~37 'Indigenous mammals'</li> <li>• A few other differences for regulatory groupings, e.g. amphibians are combined with reptiles</li> <li>• There are two sets of numbering of the lists: one set for plants, and then another set for other groups.</li> <li>• Taxon authorities only included for plants and nematodes</li> <li>• Common names often of the form 'Myna, Crested' rather than 'Crested myna' differed from 2007 and changed in 2014</li> <li>• Alternative species names (i.e. ~synonyms) included for 196 taxa</li> <li>• No exemptions or prohibitions column</li> <li>• Categories: prohibited, 1a, 1b, 2, 3 as well as context-specific listing (including for the Prince Edward Islands)</li> </ul>	<p>Department of Environmental Affairs and Tourism (2009) National Environmental Management: Biodiversity Act, 2004 Draft Alien and Invasive Species Regulations, 2009. Government Gazette, notice 347 of 2009, no. 32090, 3 April 2009, Pretoria, 3–73 pp.</p> <p>Department of Environmental Affairs and Tourism (2009) National Environmental Management: Biodiversity Act, 2004 List 1: Categories of species exempted in terms of Section 66. Government Gazette, notice 348 of 2009, no. 32090, 3 April 2009, Pretoria, 74–75 pp.</p> <p>Department of Environmental Affairs and Tourism (2009) National Environmental Management: Biodiversity Act, 2004 List 2: list of prohibited alien species in terms of Section 67. Government Gazette, notice 349 of 2009, no. 32090, 3 April 2009, Pretoria, 76–99 pp.</p> <p>Department of Environmental Affairs and Tourism (2009) National Environmental Management: Biodiversity Act, 2004 List 3: list of invasive species in terms of Section 70. Government Gazette, notice 350 of 2009, no. 32090, 3 April 2009, Pretoria, 100–128 pp.</p>
19 July 2013 (DRAFT)	733	167	567	<p>Draft regulations and lists. Technically these were not drafts, but the date of commencement '...takes effect on a date to be determined by the Minister by notice in the Gazette'. No such notice was published and the lists were rescinded by the subsequent 2014 published regulations and lists. The number of taxa included was substantially fewer than either the 2009 draft or the subsequent 2014 lists.</p> <ul style="list-style-type: none"> <li>• Lists are not numbered</li> <li>• Taxon authorities only included for plants</li> <li>• For freshwater fishes 'Unless otherwise listed, all fertile hybrids where at least one parent is an indigenous species'</li> <li>• Categories: prohibited, 1a, 1b, 2; there were no context-specific listings (e.g. for particular provinces)</li> <li>• <i>Tarentola mauritanica</i> was listed on both the prohibited and the national lists</li> </ul>	<p>Department of Environmental Affairs (2013) National Environmental Management: Biodiversity Act, 2004 Alien and Invasive Species Regulations. Government Gazette, notice 506 of 2013, no. 36683, 19 July 2013, Pretoria, 3–38 pp.</p> <p>Department of Environmental Affairs (2013) National Environmental Management: Biodiversity Act, 2004 List of Invasive Species. Government Gazette, notice 507 of 2013, no. 36683, 19 July 2013, Pretoria, 39–49 pp.</p> <p>Department of Environmental Affairs (2013) National Environmental Management: Biodiversity Act, 2004 Prohibited Alien Species. Government Gazette, notice 508 of 2013, no. 36683, 19 July 2013, Pretoria, 50–71 pp.</p> <p>Department of Environmental Affairs (2013) National Environmental Management: Biodiversity Act, 2004 Publication of Exempted Alien Species. Government Gazette, notice 509 of 2013, no. 36683, 19 July 2013, Pretoria, 72–73 pp.</p>

Date	# taxa regulated	# taxa 'invasive'	# taxa 'prohibited'	Description and notes (in particular, changes from the previous version)	Suggested citation(s)
12 Feb 2014 (DRAFT)	1123	533	591	<p>Draft regulations and lists. These lists had almost all the major features of the lists promulgated later in 2014.</p> <ul style="list-style-type: none"> <li>• First list with specific column for exemptions and/or prohibitions</li> <li>• Lists are not numbered</li> <li>• Regulatory groupings were as the 2014 lists except plants were not separated into marine vs. terrestrial and fresh-water</li> <li>• Taxon authorities for all plants and some other taxa (not apparently systematic)</li> <li>• Several plant families listed in their entirety (Agavaceae, Cactaceae, Salviniaceae)</li> <li>• Hybrids between native and alien amphibians, birds, mammals, and reptiles (but not freshwater fishes) listed (wording differs slightly 'All hybrids between indigenous and introduced species' or 'Unless otherwise listed, all hybrids between indigenous and introduced species of...')</li> <li>• All amphibians alien to South Africa prohibited</li> <li>• 'All Formicidae, Tephritidae, Apis and Vespula species not in the country, unless for biological control purposes' prohibited</li> <li>• Sterile cultivars of plants included for the first time (in the exemption column)</li> <li>• Two taxa were listed twice as both prohibited and on the national lists (<i>Chelydra serpentina</i>; <i>Nuphar lutea</i>)</li> <li>• One taxon is listed as 1b (<i>Lepidium draba</i>) but a subspecies of it is also listed as prohibited (<i>Lepidium draba</i> L. subsp. <i>chalepense</i>) this carried through into the 2014 and 2016 promulgated lists, they are regarded as separate taxa for the sake of the numbers here and below.</li> <li>• In a few cases several species were listed at the genus level whereas previously listed individually (e.g. <i>Crotalus</i> species in the 2009 lists and <i>Micropterus</i> spp. in the 2013 lists), and in both the 2009 and 2013 draft various hybrids with native taxa of <i>Anas platyrhynchos</i> were listed, the taxon and a generic provision for hybrids being listed was in the 2014 draft and later lists.</li> <li>• Categories: prohibited, 1a, 1b, 2, 3 as well as context-specific listing</li> </ul>	<p>Department of Environmental Affairs (2014) National Environmental Management: Biodiversity Act 2004 (Act No. 10 of 2004) Draft Alien and Invasive Species Lists, 2014. Government Gazette, notice 78 of 2014, no. 37320, 12 February 2014, Pretoria, 3–62 pp.</p> <p>Department of Environmental Affairs (2014) National Environmental Management: Biodiversity Act 2004 (Act No. 10 of 2004) Draft Alien and Invasive Species Regulations, 2014. Government Gazette, notice 79 of 2014, no. 37320, 12 February 2014, Pretoria, 63–96 pp.</p>
1 August 2014 (took effect 30 Sep 2014)	1118	559	559	<p>Regulations and lists. The first regulations and lists that came into effect.</p> <ul style="list-style-type: none"> <li>• Each regulatory grouping has its own numbering</li> <li>• All species with authorities noted (listed genera do not routinely include authorities)</li> <li>• 'Sterile cultivars or hybrids are not listed.' Included in the listing category</li> <li>• For plants, only the family Salviniaceae listed in its entirety</li> <li>• One prohibited taxon listed in two regulatory groupings (<i>Potamocorbula amurensis</i> as both a freshwater and marine invertebrate), carried through to 2016 lists.</li> <li>• Categories as previous</li> <li>• Several substantive differences from the Feb 2014 lists: tarantulas proposed for listing were not listed; several bird species proposed were not listed; the plant families Agavaceae[sic] and Cactaceae were proposed to be listed in their entirety but were not.</li> </ul>	<p>Department of Environmental Affairs (2014) National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations, 2014. Government Gazette, notice 598 of 2014, no. 37885, 1 August 2014, Pretoria, 3–32 pp.</p> <p>Department of Environmental Affairs (2014) National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Lists, 2014. Government Gazette, notice 599 of 2014, no. 37886, 1 August 2014, Pretoria, 1–80 pp.</p>

Date	# taxa regulated	# taxa 'invasive'	# taxa 'prohibited'	Description and notes (in particular, changes from the previous version)	Suggested citation(s)
29 May 2015 (DRAFT)	1118	558	560	<p>Draft amendments to the lists. 134 entries were proposed to be changed; however, most of these changes were not substantive (the numbers below do not add up to 134 as there can be multiple types of changes proposed for one entry)</p> <ul style="list-style-type: none"> <li>• 3 additions to the listed invasive species</li> <li>• 1 taxon moved from listed to prohibited</li> <li>• 3 deletions to the listed invasive species (all reptiles)</li> <li>• 8 changes to the listing category</li> <li>• 5 changes to the exemptions or prohibitions</li> <li>• 1 change to the regulatory grouping</li> <li>• 8 changes to the name of the taxon listed, although six of these were simply edits to the authority</li> <li>• 113 changes or additions to common names, including 94 cases where the family was removed from the listing of prohibited terrestrial invertebrates</li> </ul>	Department of Environmental Affairs (2015) National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) Draft Amendments to the Alien and Invasive Species Lists, 2015. Government Gazette, notice 493 of 2015, no. 38833, 29 May 2015, Pretoria, 3–16 pp.
29 July 2016 (took effect 27 Sep 2016)	1118	556	562	<p>Revised lists. Published as completely revised lists, noting the regulations were unchanged. 149 entries were changed; however, most of these changes were not substantive (the numbers below do not add up to 149 as there can be multiple types of changes proposed for one entry).</p> <ul style="list-style-type: none"> <li>• 3 additions to the listed invasive species (as per 2015 draft)</li> <li>• 1 addition to the prohibited species</li> <li>• 3 taxa moved from listed to prohibited</li> <li>• 4 deletions to the listed invasive species (all reptiles)</li> <li>• 19 changes to the listing category</li> <li>• 10 changes to the name of the taxon listed, although only one was a substantive change to the listed name, in other cases it was a correction to a typo, authority, or change to a synonym, although the listing of bird hybrids changed introduced to alien and excluded extra-limits.</li> <li>• 15 changes to the exemptions or prohibitions, including in two cases where permits could be issued to an association and held on behalf of its members (both birds: <i>Columba livia</i> and <i>Psittacula krameri</i>)</li> <li>• 116 changes or additions to common names, including 95 cases where the family was removed from the listing of prohibited terrestrial invertebrates</li> <li>• Changes for some fish listings refer to all lakes rather than just natural lakes</li> </ul>	Department of Environmental Affairs (2016) National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) Alien and Invasive Species Lists. Government Gazette, notice 864 of 2016, no. 40166, 29 July 2016, Pretoria, 31–77 pp.
8 Feb 2017	1117	555	562	<p>Proposed amendment. Proposed deletion of <i>Diceros bicornis</i> subsp. <i>michaeli</i> (the Eastern black rhinoceros) from the invasive species lists and addition to the threatened or protected species list.</p>	Department of Environmental Affairs (2017) National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) Proposed Amendment of the Invasive Species List and Proposed Listing of Species that are Threatened of Protected, Restricted Activities that are Prohibited and Exemption from Restriction. Government Gazette, notice 76 of 2017, no. 40601, 8 February 2017, Pretoria, 27–28 pp.

Date	# taxa regulated	# taxa 'invasive'	# taxa 'prohibited'	Description and notes (in particular, changes from the previous version)	Suggested citation(s)
16 Feb 2018	581	581	NA	<p>Draft regulations and amendments to the lists. Published as fully revised draft regulations and tables of proposed amendments to the lists (rather than fully revised lists). The prohibited list was proposed to be removed and further changes to 83 listed taxa.</p> <ul style="list-style-type: none"> <li>• 16 additions: 7 freshwater fishes and 9 plant taxa, almost all as category 2 or 3</li> <li>• 13 deletions: 12 birds and 1 mammal (the black rhinoceros)</li> <li>• 5 changes to the listed name</li> <li>• 48 changes to the listing category, this included 19 plant taxa for which the provision that 'Sterile cultivars or hybrids are not listed.' was removed; 22 taxa that were previously prohibited were added to the lists (half of which freshwater fishes); <i>Mus musculus</i> moved from 1b to 1a on Marion Island, <i>Hakea salicifolia</i> moved from 1b to 1a in the Western Cape, provision for permits for <i>Ammophila arenaria</i> as category 2 in the Western Cape.</li> <li>• 5 changes to the common name</li> <li>• 3 changes to the exemptions or prohibitions</li> </ul>	<p>Department of Environmental Affairs (2018) National Environmental Management: Biodiversity Act 2004 (Act No.10 of 2004) Draft Alien and Invasive Species Regulations. Government Gazette, notice 112 of 2018, no. 41445, 16 February 2018, Pretoria, 61–87 pp.</p> <p>Department of Environmental Affairs (2018) National Environmental Management: Biodiversity Act 2004 (Act No.10 of 2004) Draft Amendments to the Alien and Invasive Species Lists. Government Gazette, notice 115 of 2018, no. 41445, 16 February 2018, Pretoria, 97–115 pp.</p>
22 June 2018	NA	NA	NA	<p>Extension to the period for commenting on the draft regulations and lists published 16 Feb 2018.</p>	<p>Department of Environmental Affairs (2018) National Environmental Management: Biodiversity Act 2004 (Act No.10 of 2004) Notice extending the public commenting period for the Draft Amendments to the Alien and Invasive Species Regulations and the draft amendments to the Alien and Invasive Species Lists. Government Gazette, notice 616 of 2018, no. 41722, 22 June 2018, Pretoria, p. 38.</p>
21 Sep 2018	1117	555	562	<p>Proposed amendment. Proposed deletion of <i>Diceros bicornis</i> subsp. <i>michaeli</i> (the Eastern black rhinoceros) from the invasive species lists and addition to the threatened or protected species list. Essentially repeats the notice of 8 Feb 2017.</p>	<p>Department of Environmental Affairs (2018) National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) Proposed Amendment of the Alien and Invasive Species List and List of Critically Endangered, Endangered, Vulnerable, and Protected Species. Government Gazette, notice 988 of 2018, no. 41919, 21 September 2017, Pretoria, 29–31 pp.</p>
3 June 2020	1117	555	562	<p>Amendment. Deletion of <i>Diceros bicornis</i> subsp. <i>michaeli</i> (the Eastern black rhinoceros) from the invasive species lists and addition to the threatened or protected species list. Essentially repeats the notices of 8 Feb 2017 and 21 Sep 2018. 'This notice comes into operation on a date determined by the Minister by notice in the Gazette', no such notice was noted here, but the issue was resolved by the promulgation of the revised lists in March 2021.</p>	<p>Department of Environment, Forestry and Fisheries (2020) National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) Amendment of the Alien and Invasive Species List and List of Critically Endangered, Endangered, Vulnerable, and Protected Species. Government Gazette, notice 627 of 2020, no. 43386, 3 June 2020, Pretoria, 26–32 pp.</p>

Date	# taxa regulated	# taxa 'invasive'	# taxa 'prohibited'	Description and notes (in particular, changes from the previous version)	Suggested citation(s)
18 Sep 2020 (lists) and 25 Sep 2020 (regulations) These were intended to take effect 19 and 26 Oct 2020 respectively, but were deferred to 1 March 2021)	568	568	NA	Revised regulations and lists. The prohibited list was removed and further changes to 73 listed taxa. The changes were similar to those proposed in the 2018 drafts. <ul style="list-style-type: none"> <li>• 4 additions (all freshwater fishes as category 2)</li> <li>• 14 deletions: 12 birds, 1 mammal (the black rhinoceros), and 1 insect (<i>Bactrocera invadens</i>)</li> <li>• 10 changes to the listed name</li> <li>• 45 changes to listing category, this included 19 plant taxa for which the provision that 'Sterile cultivars or hybrids are not listed.' was removed; 20 taxa that were previously prohibited were added to the lists (9 of which freshwater fishes), <i>Mus musculus</i> moved from 1b to 1a on Marion Island, provision for permits for <i>Ammophila arenaria</i> as category 2 in the Western Cape, <i>Coreopsis lanceolata</i> moved from category 1a to 1b.</li> <li>• 5 changes to the common name</li> <li>• 2 changes to the exemptions or prohibitions</li> <li>• <i>Cabomba</i> species were prohibited in 2016, proposed as 1a in 2018 drafts, but not included on the 2020 lists.</li> </ul>	Department of Environment, Forestry and Fisheries (2020) National Environmental Management: Biodiversity Act (Act No. 10 of 2004) Alien and Invasive Species Regulations. Government Gazette, notice 1020 of 2020, no. 43735, 25 September 2020, Pretoria, 14–44 pp. Department of Environment, Forestry and Fisheries (2020) National Environmental Management: Biodiversity Act (Act No. 10 of 2004) Alien and Invasive Species Lists, 2020. Government Gazette, notice 1003 of 2020, no. 43726, 18 September 2020, Pretoria, 31–77 pp.
16 Oct 2020	NA	NA	NA	Extension to commencement date. The promulgation of the 2020 revised lists and regulations was deferred from 19 and 26 October (respectively) to 1 March 2021.	Department of Environment, Forestry and Fisheries (2020) National Environmental Management: Biodiversity Act (Act No. 10 of 2004) Extension of commencement date of the Alien and Invasive Species Lists, 2020 and the Alien and Invasive Species Regulations, 2020. Government Gazette, notice 1100 of 2020, no. 43818, 16 October 2020, Pretoria, 3–4 pp.
24 Feb 2021	566	566	NA	Removal of trout species from the lists. This notice removed two invasive freshwater fish taxa ( <i>Oncorhynchus mykiss</i> and <i>Salmo trutta</i> ) from the lists published 18 Sep 2020 before the lists came into effect on 1 March 2021. As a result, the numbering of the freshwater fishes has gaps in it.	Department of Environment, Forestry and Fisheries (2021) National Environmental Management: Biodiversity Act (Act No. 10 of 2004) Commencement of the Alien and Invasive Species Lists, 2020 and the Alien and Invasive Species Regulations, 2020. Government Gazette, notice 115 of 2021, no. 44182, 24 February 2021, Pretoria, 3–4 pp.

**Supplementary table 2: Taxa for which the regulatory listing has changed over time**

This list only included additions, deletions, and changes related to the category of listing. Changes to the exemptions and prohibitions are not included but are outlined in Wilson (2024). Taxa listed as prohibited in 2014 and/or 2016 are not shown as deletions as the whole prohibited list was removed in 2020 (unless such prohibited taxa were listed in a different category in 2020 or were listed as present in the country in either 2014 or 2016). The name shown is as per the most recent regulations in which the taxon appeared, with the taxonomic backbone used outlined in Wilson (2024). Note, none of these changes were directly informed by risk analyses outlined in Supplementary table 5 as the governmental Risk Analysis Review Committee (RARC) had not been set up in 2020. The column headings align with those used in the species lists compiled as part of the national status report (Zengeya & Wilson, 2023). Where listings are complicated (e.g. different in different regions or there are lengthy prohibitions and/or exemptions) the listing is simply phrased here as “various”.

regulatoryName	2014 listing	2016 listing	2020 listing	Notes
<i>Achatina fulica</i> Bowdich, 1822	prohibited	prohibited	3	None
<i>Acridotheres cristatellus</i> (Linnaeus, 1758)	2	2	not listed	None
<i>Acridotheres fuscus</i> Wagler, 1827	2	2	not listed	None
<i>Ammophila arenaria</i> (L.) Link	3	3	a. 2 in Western Cape   b. Not listed elsewhere	None
<i>Arapaima gigas</i> (Schinz, 1822)	prohibited	prohibited	3	None
<i>Bactrocera dorsalis</i> (Hendel, 1912)	prohibited	prohibited	1a	Both <i>B. dorsalis</i> and <i>B. invadens</i> are valid names (as per GBIF, 6 November 2023), however, only <i>B. dorsalis</i> is regulated in South Africa at present.
<i>Bactrocera invadens</i> (Drew, Tsuruta and White, 2005)	1a	1a	not listed	Both <i>B. dorsalis</i> and <i>B. invadens</i> are valid names (as per GBIF, 6 November 2023), however, only <i>B. dorsalis</i> is regulated in South Africa at present.
<i>Bitis nasicornis</i> (Shaw, 1792)	various	various	various	The taxon was listed in Gauteng in 2014, but not in 2016 and 2020
<i>Bitis rhinoceros</i> (Schlegel, 1855)	various	various	various	The taxon was listed in Gauteng in 2014, but not in 2016 and 2020
<i>Boa constrictor</i> Linnaeus, 1758	various	various	various	The taxon was listed in Gauteng in 2014, but not in 2016 and 2020
<i>Bos frontalis</i> Lambert, 1804	prohibited	prohibited	2	None
<i>Canna indica</i> L.	1b*	1b*	1b	*Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020
<i>Carcinus maenas</i> (Linnaeus, 1758)	not listed	1b	1b	None
<i>Carduelis carduelis</i> (Linnaeus, 1758)	2	2	not listed	None
<i>Carduelis chloris</i> (Linnaeus, 1758)	2	2	not listed	None
<i>Carduelis flammea</i> (Linnaeus, 1758)	2	2	not listed	None
<i>Cestrum</i> species not specifically listed	3*	3*	3	*Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020
<i>Chamaeleo jacksonii</i> Boulenger, 1896	various	not listed	not listed	None
<i>Chamaeleo melleri</i> (Gray, 1865)	various	not listed	not listed	None
<i>Cherax cainii</i> (Austin & Ryan, 2002)	not listed	2	2	None
<i>Cichla</i> species	prohibited	prohibited	1a	None
<i>Clarias gariepinus</i> (Burchell, 1822)	not listed	not listed	2	None
<i>Colinus virginianus</i> (Linnaeus, 1758)	2	2	not listed	None
<i>Colossoma</i> species	prohibited	prohibited	1a	None
<i>Columba livia</i> (Gmelin, 1789)	3	a. 3   b. 2 for all restricted activities relating to racing and showing of pigeons.	a. 3   b. 2 for all restricted activities relating to racing and showing of pigeons.	None
<i>Columba palumbus</i> Linnaeus, 1758	2	2	not listed	None
<i>Coreopsis lanceolata</i> L.	1a*	1a*	1b	*Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020



regulatoryName	2014 listing	2016 listing	2020 listing	Notes
<i>Cortaderia selloana</i> (Schult.) Asch. & Graebn.	1b*	1b*	1b	*Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020
<i>Crotalus species</i> Linnaeus, 1758	2	not listed	not listed	none
<i>Ctenopharyngodon idella</i> (Valenciennes in Cuvier & Valenciennes, 1844)	various	various	various	In 2016 and 2020, provision for all lakes, in 2014 just for natural lakes
<i>Cyprinus carpio</i> (Linnaeus, 1758)	various	various	various	In 2016 and 2020 permits could be issued to release fish into dams within a catchment where the fish did not occur, in 2014 such permits could only be issued if the taxon already occurred in the catchment
<i>Dendrocygna eytoni</i> (Eyton, 1838)	1b	1b	not listed	none
<i>Diceros bicornis michaeli</i> Zukowsky, 1965	2	2	not listed	none
<i>Electrophorus electricus</i> (Linnaeus, 1766)	prohibited	prohibited	3	none
<i>Foudia madagascariensis</i> (Linnaeus, 1766)	3	3	not listed	none
<i>Giraffa camelopardalis</i> (Linnaeus, 1758) (all subspecies with the exception of <i>giraffa</i> )	prohibited	prohibited	2	none
<i>Gleditsia triacanthos</i> L.	1b*	1b*	1b	*Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020
<i>Hippotragus niger</i> Harris, 1838 (all subspecies except of <i>H. n. niger</i> )	prohibited	prohibited	2	none
<i>Iguana iguana</i> (Linnaeus, 1758)	various	various	various	In 2014 listed as 'a. 2 in KwaZulu-Natal, Mpumalanga, Eastern Cape, Gauteng and Limpopo.   b. Not listed elsewhere.'   in 2016 and 2020 listed as 'a. 1b in KwaZulu-Natal and Northern Cape   b. 2 in Mpumalanga, Eastern Cape and Limpopo.   c. Not listed elsewhere.'
<i>Ipomoea indica</i> (Burm.) Merr. (= <i>I. congesta</i> R.Br.)	1b*	1b*	1b	Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020
<i>Ipomoea purpurea</i> (L.) Roth	1b*	1b*	1b	Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020
<i>Lates calcarifer</i> (Blotch, 1790)	not listed	not listed	2	none
<i>Ligustrum lucidum</i> W.T.Aiton	various*	various*	various	*Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020
<i>Limonium sinuatum</i> (L.) Mill.	various*	various*	various	*Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020
<i>Metrosideros excelsa</i> Sol. ex Gaertn. (= <i>M. tomentosa</i> A.Rich.)	various*	various*	various	*Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020
<i>Micropterus dolomieu</i> (Lacepède, 1802)	various	various	various	In 2016 and 2020, category 3 for all lakes, in 2014 just for natural lakes
<i>Micropterus floridanus</i> (Lesueur, 1822)	various	various	various	In 2016 and 2020, category 3 for all lakes, in 2014 just for natural lakes
<i>Micropterus floridanus</i> (Lesueur, 1822) x <i>Micropterus salmoides</i> (Lacepède, 1802)	various	various	various	In 2016 and 2020, category 3 for all lakes, in 2014 just for natural lakes
<i>Micropterus punctulatus</i> (Rafinesque, 1819)	various	various	various	In 2016 and 2020, category 3 for all lakes, in 2014 just for natural lakes
<i>Micropterus salmoides</i> (Lacepède, 1802)	various	various	various	In 2016 and 2020, category 3 for all lakes, in 2014 just for natural lakes
<i>Molothrus bonariensis</i> (Gmelin, 1789)	3	3	not listed	none
<i>Morus alba</i> L.	various*	various*	various	*Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020
<i>Mus musculus</i> Linnaeus, 1758	a. 1b for off-shore islands.   b. Not listed elsewhere.	a. 1b for off-shore islands.   b. Not listed elsewhere.	a. 1a for Marion Island   b. 1b for off-shore islands.   c. Not listed elsewhere.	In 2020 listed explicitly as '1a for Marion Island.'
<i>Myleus species</i>	prohibited	prohibited	1a	none
<i>Nephrolepis cordifolia</i> (L.) C.Presl (= <i>Polypodium cordifolium</i> L.)	various*	various*	various	*Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020
<i>Nerium oleander</i> L.	1b*	1b*	1b	*Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020
<i>Oncorhynchus kisutch</i> (Walbaum, 1792)	not listed	not listed	2	none
<i>Oncorhynchus tshawytscha</i> (Walbaum, 1792)	not listed	not listed	2	none
<i>Orconectes limosus</i> (Rafinesque, 1817)	prohibited	prohibited	1a	none

regulatoryName	2014 listing	2016 listing	2020 listing	Notes
<i>Orconectes rusticus</i> (Girard, 1852)	prohibited	prohibited	1a	none
<i>Oreochromis</i> species excluding <i>Oreochromis mossambicus</i> and <i>Oreochromis placidus</i>	various	various	a. 3   b. 2 for permitted aquaculture facilities	In 2014 and 2016 two taxa listed ' <i>Oreochromis niloticus</i> (Linnaeus, 1758)' and ' <i>Oreochromis</i> species (excluding species already in South Africa and species indigenous to South Africa)'
<i>Oxyura jamaicensis</i> (Gmelin, 1789)	prohibited	prohibited	2	none
<i>Pacifastacus leniusculus</i> (Dana, 1852)	prohibited	prohibited	1a	none
<i>Pantherophis guttatus guttatus</i>	3	not listed	not listed	none
<i>Pinus elliotti</i> Engelm. and hybrids, varieties and selections	a. 2 for sterile specimens.   b. 1b for non-sterile specimens.	a. 2 for sterile specimens.   b. 1b for non-sterile specimens.	2	none
<i>Pinus pinaster</i> Aiton and hybrids, varieties and selections	various	various	various	Rewording of one of the provisions in 2016 compared to 2014. In 2020 areas in parts of the W Cape previously exempt in 2014 and 2016 no longer exempt if trees pose a wildfire risk; clarification that trees smaller than set circumference are Category 1b
<i>Pinus radiata</i> D.Don and hybrids, varieties and selections	various	various	various	Rewording of one of the provisions in 2016 compared to 2014. In 2020 areas in parts of the W Cape previously exempt in 2014 and 2016 no longer exempt if trees pose a wildfire risk; clarification that trees smaller than set circumference are Category 1b
<i>Pycnonotus jocosus</i> (Linnaeus, 1758)	2	2	not listed	none
<i>Pygocentrus</i> species	prohibited	prohibited	3	none
<i>Pyracantha angustifolia</i> (Franch.) C.K.Schneid.	1b*	1b*	1b	*Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020
<i>Pyracantha coccinea</i> M.Roem.	1b*	1b*	1b	*Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020
<i>Pyracantha crenatoserrata</i> (Hance) Rehder (= <i>P. fortuneana</i> misapplied)	1b*	1b*	1b	*Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020
<i>Pyracantha crenulata</i> (D.Don) M.Roem; including var. <i>rogersiana</i> (= <i>P. rogersiana</i> (A.B.Jacks.) Chitt.)	1b*	1b*	1b	*Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020
<i>Pyracantha koidzumii</i> (Hayata) Rehder	1b*	1b*	1b	*Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020
<i>Python bivittatus</i> (Kuhl, 1820)	not listed	2	2	none
<i>Python molurus</i> (Linnaeus, 1758)	2	prohibited	not listed	none
<i>Python sebae</i> (Gmelin, 1788)	various	prohibited	not listed	none
<i>Rooseveltiella</i> species	prohibited	prohibited	3	none
<i>Schilbe</i> species (except those that are indigenous to South Africa)	prohibited	prohibited	3	none
<i>Serrasalmus</i> species	prohibited	prohibited	3	none
<i>Sicalis flaveola</i> (Linnaeus, 1766)	2	2	not listed	none
<i>Streptopelia picturata</i> (Temminck, 1813)	prohibited	prohibited	2	none
<i>Struthio camelus molybdophanes</i> Reichenow, 1883	prohibited	prohibited	2	none
<i>Trachemys</i> species	1b	2	2	none
<i>Vinca major</i> L.	1b*	1b*	1b	*Sterile cultivars or hybrids were not listed in 2014 and 2016 but were listed in 2020

**Supplementary table 3:** Taxa listed as category 2 under the National Environmental Management: Biodiversity Act (NEM:BA), Alien and Invasive Species (A&IS) Lists for which permits have been issued as of December 2022

This excludes import permits and permits for research, biocontrol or display purposes which can be issued for any listed taxon. It includes taxa that were listed as category 2 at the time the permit was issued, noting that the listing category might have subsequently changed (cf. Supplementary table 2). For *Axis* spp., *Eucalyptus* spp., *Kobus leche*, *Ovis aries* it is not clear if the entity for which a permit was issued is the same as listed under the regulations (as the latter is a subspecific entity). The information is based on data provided by the Department of Forestry, Fisheries and the Environment (DFFE) to the South African National Biodiversity Institute (SANBI) as part of the national status report [adapted from Table S5.6 in Zengeya & Wilson (2023)]. The column headings are intended to align with those used in the species list compiled as part of the national status report.

scientificName	PermitsGranted
<i>Axis</i> C.H.Smith, 1827	1
<i>Eucalyptus</i> L'Hér.	6
<i>Kobus leche</i> Gray, 1850	3
<i>Ovis aries</i> Linnaeus, 1758	1
<i>Acacia dealbata</i> Link	11
<i>Acacia decurrens</i> Willd.	5
<i>Acacia mearnsii</i> De Wild.	66
<i>Acacia melanoxylon</i> R.Br.	22
<i>Addax nasomaculatus</i> (Blainville, 1816)	11
<i>Aepyceros melampus</i> (Lichtenstein, 1812) subsp. <i>petersi</i> Bocage, 1879	8
<i>Agave sisalana</i> Perrine	4
<i>Alectoris chukar</i> (J.E.Gray, 1830)	3
<i>Ammophila arenaria</i> (L.) Link	0
<i>Ammotragus lervia</i> (Pallas, 1777)	81
<i>Anas platyrhynchos</i> Linnaeus, 1758	3
<i>Anolis carolinensis</i> Voigt, 1832	0
<i>Antilope cervicapra</i> (Linnaeus, 1758)	20
<i>Atriplex nummularia</i> Lindl. subsp. <i>nummularia</i>	1
<i>Axis axis</i> (Erxleben, 1777)	29
<i>Axis porcinus</i> (Zimmermann, 1780)	24
<i>Basiliscus plumifrons</i> Cope, 1875	7
<i>Basiliscus vittatus</i> Wiegmann, 1828	0
<i>Bitis nasicornis</i> (Shaw & Nodder, 1792)	20
<i>Bitis rhinoceros</i> (Schlegel, 1855)	29
<i>Boa constrictor</i> Linnaeus, 1758	88
<i>Bos frontalis</i> Lambert, 1804	0
<i>Boselaphus tragocamelus</i> (Pallas, 1766)	1
<i>Casuarina cunninghamiana</i> Miq.	125
<i>Casuarina equisetifolia</i> L.	15
<i>Cenchrus purpureus</i> (Schumach.) Morrone	7
<i>Centrochelys sulcata</i> (Miller, 1779)	18
<i>Cervus elaphus</i> Linnaeus, 1758	23
<i>Cervus nippon</i> Temminck, 1838	0
<i>Chelydra serpentina</i> (Linnaeus, 1758)	10
<i>Cherax cainii</i> Austin & Ryan, 2002	0
<i>Cherax tenuimanus</i> Smith, 1912	22
<i>Clarias gariepinus</i> (Burchell, 1822)	1
<i>Columba livia</i> J.F.Gmelin, 1789	1
<i>Ctenopharyngodon idella</i> (Valenciennes, 1844)	432
<i>Cyprinus carpio</i> Linnaeus, 1758	16
<i>Dama dama</i> (Linnaeus, 1758)	325
<i>Dendrobates auratus</i> (Girard, 1855)	1
<i>Dendrobates tinctorius</i> (Cuvier, 1797)	3
Dendrobatidae Cope, 1865	4
<i>Duranta erecta</i> L.	3
<i>Elaphurus davidianus</i> Milne-Edwards, 1866	3
<i>Erythrocebus patas</i> (Schreber, 1774)	5
<i>Eucalyptus camaldulensis</i> Dehnh.	20
<i>Eucalyptus cladocalyx</i> F.Muell.	10
<i>Eucalyptus conferruminata</i> D.J.Carr & S.G.M.Carr	1
<i>Eucalyptus diversicolor</i> F.Muell.	2
<i>Eucalyptus grandis</i> W.Hill ex Maiden	36
<i>Eucalyptus tereticornis</i> Sm.	2
<i>Fringilla coelebs</i> Linnaeus, 1758	0
<i>Furcifer oustaleti</i> (Mocquard, 1894)	0
<i>Furcifer pardalis</i> (Cuvier, 1829)	4
<i>Gambusia affinis</i> (Baird & Girard, 1853)	3

scientificName	PermitsGranted
<i>Gekko gecko</i> (Linnaeus, 1758)	2
<i>Giraffa camelopardalis</i> (Linnaeus, 1758)	2
<i>Hippotragus equinus</i> (É.Geoffroy Saint-Hilaire, 1803) subsp. <i>koba</i> (Gray, 1872)	2
<i>Hippotragus niger</i> Harris, 1838	1
<i>Hydrochoerus hydrochaeris</i> (Linnaeus, 1766)	2
<i>Hypericum perforatum</i> L.	0
<i>Iguana iguana</i> (Linnaeus, 1758)	33
<i>Jatropha curcas</i> L.	0
<i>Kobus ellipsiprymnus</i> (Ogilby, 1833) subsp. <i>crawshayi</i> (P.L.Sclater, 1894)	1
<i>Kobus ellipsiprymnus</i> (Ogilby, 1833) subsp. <i>defassa</i> (Rüppell, 1835)	1
<i>Kobus leche</i> Gray, 1850 subsp. <i>kafuensis</i> Haltenorth, 1963	52
<i>Kobus leche</i> Gray, 1850 subsp. <i>leche</i> Gray, 1850	635
<i>Kobus vardonii</i> (Livingstone, 1857)	1
<i>Lates calcarifer</i> (Bloch, 1790)	2
<i>Leucaena leucocephala</i> (Lam.) De Wit.	3
<i>Macaca fascicularis</i> (Raffles, 1821)	0
<i>Macrochelys temminckii</i> Troost, 1835	12
<i>Magallana gigas</i> (Thunberg, 1793)	3
<i>Micropterus dolomieu</i> Lacepède, 1802	2
<i>Micropterus floridanus</i> (Lesueur, 1822)	0
<i>Micropterus floridanus</i> (Lesueur, 1822) x <i>Micropterus salmoides</i> (Lacepède, 1802)	0
<i>Micropterus punctulatus</i> (Rafinesque, 1819)	0
<i>Micropterus salmoides</i> (Lacepède, 1802)	13
<i>Morelia spilota</i> (Lacépède, 1804)	64
<i>Murraya paniculata</i> (L.) Jack	13
<i>Myocastor coypus</i> (Molina, 1782)	1
<i>Mytilus galloprovincialis</i> Lamarck, 1819	0
<i>Nasturtium officinale</i> W.T.Aiton	26
<i>Nesoenas picturatus</i> (Temminck, 1813)	0
<i>Oncorhynchus kisutch</i> (Walbaum, 1792)	8
<i>Oncorhynchus tshawytscha</i> (Walbaum, 1792)	4
<i>Oreochromis niloticus</i> (Linnaeus, 1758)	457
<i>Oryx dammah</i> (Cretzschmar, 1827)	96
<i>Ovis aries</i> Linnaeus, 1758 subsp. <i>musimon</i> (Pallas, 1811)	12
<i>Oxyura jamaicensis</i> (Gmelin, 1789)	0
<i>Passiflora edulis</i> Sims	7
<i>Penaeus indicus</i> H.Milne Edwards, 1837	0
<i>Penaeus monodon</i> Fabricius, 1798	0
<i>Penaeus vannamei</i> Boone, 1931	1
<i>Pinus elliotii</i> Engelm.	20
<i>Pinus patula</i> Schiede ex Schltdl. & Cham.	46
<i>Pinus pinaster</i> Aiton	32
<i>Pinus radiata</i> D.Don	18
<i>Pinus roxburghii</i> Sarg.	0
<i>Pinus taeda</i> L.	7
<i>Populus alba</i> L.	18
<i>Populus x canescens</i> (Aiton) Sm.	12
<i>Psidium guajava</i> L.	6
<i>Psittacula krameri</i> (Scopoli, 1769)	315
<i>Psittacula krameri</i> (Scopoli, 1769) subsp. <i>manillensis</i> (Bechstein, 1800)	10
<i>Pycnonotus cafer</i> (Linnaeus, 1766)	0
<i>Python bivittatus</i> Kuhl, 1820	101
<i>Ricinus communis</i> L.	12
<i>Rubus fruticosus</i> L. agg.	2
<i>Rusa unicolor</i> (Kerr, 1792)	8
<i>Selenicereus undatus</i> Haw. & D.R.Hunt	13
<i>Simalia amethystina</i> (Schneider, 1801)	1
<i>Sorghum halepense</i> (L.) Pers.	0
<i>Struthio molybdophanes</i> Reichenow, 1883	0
<i>Syngonium podophyllum</i> Schott	0
<i>Trachemys</i> Agassiz, 1857	2
<i>Trachemys scripta</i> (Thunberg In Schoepff, 1792) subsp. <i>elegans</i> (Wied, 1838)	16
<i>Tragelaphus derbianus</i> (Gray, 1847)	2
<i>Tragelaphus spekii</i> Speke, 1863	4
<i>Trioceros jacksonii</i> (Boulenger, 1896)	0
<i>Trioceros melleri</i> (Gray, 1865)	0

**Supplementary table 4:** Members of the Alien Species Risk Analysis Review Panel (ASRARP) from 16 July 2018 as of 31 March 2024 (encompassing the 4<sup>th</sup> to the 29<sup>th</sup> panel meetings)

This includes SANBI staff who had an active role in ASRARP discussions and developing recommendations (marked as *ex-officio*) and those who assisted with the administration of the panel (marked as secretariat). Hiatuses in the panel (31 March 2020–18 May 2020 and 31 March 2022–3 June 2022 are not shown).

Member	Status	Dates	Role
Ashlyn Padayachee	current	1 August 2022–	secretariat
Graham Alexander	current	17 July 2018–31 March 2022   16 May 2023–	independent member
John Wilson	current	17 July 2018–	<i>ex-officio</i> ; chair for the 3 <sup>rd</sup> –13 <sup>th</sup> meetings
Kanyisa Jama	current	3 June 2022–	independent member
Lynn Jackson	current	17 July 2018–	independent member; chair for the 14 <sup>th</sup> –21 <sup>st</sup> meetings; current vice-chair (from the 22 <sup>nd</sup> meeting onwards)
Mlungele Nsikani	current	1 May 2020–	<i>ex-officio</i> ; secretariat for the 13 <sup>th</sup> and 18 <sup>th</sup> meetings
René Brink	current	1 January 2024–	secretariat
Sjirk Geerts	current	1 May 2020–	independent member; current chair (from the 22 <sup>nd</sup> meeting onwards)
Sabrina Kumschick	current	17 July 2018–	independent member
Tatenda Dalu	current	1 August 2022–	independent member
Anicia Maola	previous	1 May 2020–31 October 2020   1 Nov 2020–30 April 2021   1 May 2021–31 August 2021	secretariat for the 15 <sup>th</sup> –17 <sup>th</sup> meetings; otherwise independent member
Brian van Wilgen	previous	1 May 2020–31 March 2022	independent member
Buyisile Makhubo	previous	24 July 2018–31 March 2022	independent member
Current Masunungure	previous	1 May 2020–31 March 2022	independent member
Dikonketso Tlaamela	previous	1 Nov 2020–30 April 2021	secretariat for the 14 <sup>th</sup> and 16 <sup>th</sup> meetings
Essa Suleman	previous	24 July 2018–1 Oct 2018   25 January 2019–31 March 2022	<i>ex-officio</i> for the first period; independent member for the second period
Julie Coetzee	previous	26 August 2016–31 March 2018	independent member
Khensani Nkuna	previous	17 July 2018–31 March 2020	secretariat for the 6 <sup>th</sup> –12 <sup>th</sup> meetings
Kowiyou Yessoufou	previous	1 May 2020–31 March 2022	independent member
Mamohale Chaisi	previous	1 May 2020–31 March 2022	<i>ex-officio</i>
Mandisa Poswa	previous	24 July 2018–17 May 2023	independent member; vice-chair for the 18 <sup>th</sup> –21 <sup>st</sup> meetings
Mark Robertson	previous	17 July 2018–31 January 2019	independent member
Menno Klapwijk	previous	1 May 2020–25 May 2021	independent member
Musa Mlambo	previous	17 July 2018–16 Feb 2022	independent member
Muzi Mashabane	previous	1 August 2023–31 October 2023	secretariat
Olaf Weyl	previous	17 July 2018–31 January 2019	independent member
Owen Horwood	previous	17 July 2018–31 March 2020	independent member
Phillipa King	previous	1 May 2020–31 March 2022	independent member
Ryan Blanchard	previous	17 July 2018–31 March 2022	independent member
Samuel Motitsoe	previous	1 May 2020–31 March 2022	independent member
Sebataolo Rahlao	previous	17 July 2018–1 Sep 2021	<i>ex-officio</i>
Sheunesu Ruwanza	previous	17 July 2018–31 March 2022	independent member
Sibusisiwe Ngcobo	previous	1 May 2020–31 March 2022	independent member
Thabiso Mokotjomela	previous	17 July 2018–31 October 2018	independent member
Timothy Dube	previous	1 May 2020–31 March 2022	independent member
Trudy Paap	previous	1 May 2020–31 March 2022	independent member
Tshifhiwa Matamela	previous	17 July 2018–31 March 2020	independent member
Viwe Balfour	previous	17 July 2018–1 June 2023	secretariat
Willem de Lange	previous	17 July 2018–31 January 2019	independent member

**Supplementary table 5:** Risk analyses submitted by the South African National Biodiversity Institute (SANBI) to the Department of Forestry, Fisheries and the Environment (DFFE) following review by the Alien Species Risk Analysis Review Panel (ASRARP) as of 30 April 2024

These recommendations have no legal basis and have not, as yet, been scrutinised by the Risk Analysis Review Committee (RARC). The RARC will consider the recommendations with a view to potentially changing the National Environmental Management: Biodiversity Act (NEM:BA), Alien and Invasive Species (A&IS) Lists. The RARC may, of course, decide on a different regulatory listing, category, and prohibitions/exemptions to those recommended by a given risk analyses, not least as additional information might come to light that will require a risk analysis to be revised. While all the risk analyses have a digital object identifier, none of them are in the public domain (this is due to be discussed again once the RARC has had an opportunity to review the recommendations and comment on them). The regulatory name and listing are as they were on the date of submission of the risk analysis to DFFE. The column headings are intended to align with those used in the species lists compiled as part of the national status report (Zengeya & Wilson, 2023).

regulatoryName	RegulatoryListing	Exemption or prohibition	Recommended regulatoryName	Recommended RegulatoryListing	Recommended exemptions or prohibitions	Notes	Date approved	Flagged for re-evaluation	DOI
<i>Acacia adunca</i> A.Cunn. ex G.Don	1a	none	as listed	1a	none	none	26 March 2022	no	10.5281/zenodo.6386256
<i>Acacia cyclops</i> A.Cunn. ex G.Don	1b	none	as listed	1b	none	none	26 April 2024	no	10.5281/zenodo.11072848
NA	not listed	NA	<i>Acacia cultriformis</i> A.Cunn. ex G.Don	1b	none	none	10 January 2023	no	10.5281/zenodo.7520507
<i>Acacia dealbata</i> Link	2	none	as listed	1b	use for community livelihood purposes exempt	none	30 September 2020	no	10.5281/zenodo.4060202
<i>Acacia decurrens</i> Willd. and hybrids, varieties and selections	2	Exempted for an existing plantation	<i>Acacia decurrens</i> Willd.	1b	none	none	23 April 2021	no	10.5281/zenodo.4715071
<i>Acacia fimbriata</i> A.Cunn. ex G.Don	1a	none	as listed	1a	none	none	30 March 2022	no	10.5281/zenodo.6396178
<i>Acacia implexa</i> Benth.	1a	none	as listed	1a	none	none	30 March 2022	yes, by 2027	10.5281/zenodo.6395967
<i>Acacia longifolia</i> (Andrews) Willd.	1b	none	as listed	1b	none	none	19 June 2023	no	10.5281/zenodo.8055217
<i>Acacia mearnsii</i> De Wild. and hybrids, varieties and selections	2	Exempted for an existing plantation	<i>Acacia mearnsii</i> De Wild.	2	use for community livelihood purposes exempt	none	23 April 2021	no	10.5281/zenodo.4715075
<i>Acacia paradoxa</i> DC. (= <i>A. armata</i> R.Br.)	1a	none	<i>Acacia paradoxa</i> DC.	1a	none	none	26 February 2021	no	10.5281/zenodo.4564539
<i>Acacia pycnantha</i> Benth.	1b	none	as listed	1b	none	none	24 April 2024	no	10.5281/zenodo.11058434

regulatoryName	RegulatoryListing	Exemption or prohibition	Recommended regulatoryName	Recommended RegulatoryListing	Recommended exemptions or prohibitions	Notes	Date approved	Flagged for re-evaluation	DOI
<i>Acacia stricta</i> (Andrews) Willd.	1a	none	as listed	1a	none	none	30 March 2020	yes, by 2025	10.5281/zenodo.3732943
<i>Acarapis woodi</i> (Rennie, 1921)	1b	none	as listed	1b	none	none	15 March 2019	no	10.5281/zenodo.4751650
<i>Acer buergerianum</i> Miq.	various	none	as listed	1b	trees >50m outside of riparian areas exempt	none	31 March 2023	no	10.5281/zenodo.7788943.
<i>Acer negundo</i> L.	various	none	as listed	1b	none	none	31 March 2023	no	10.5281/zenodo.7788996
<i>Addax nasomaculatus</i> (de Blainville, 1816)	2	none	<i>Addax nasomaculatus</i> (Blainville, 1816)	do not list	NA	none	12 February 2021	no	10.5281/zenodo.4536863
<i>Aepyceros melampus petersi</i> Bocage, 1879	2	none	<i>Aepyceros melampus</i> (Lichtenstein, 1812) subsp. <i>petersi</i> Bocage, 1879	1b	none	none	4 March 2021	no	10.5281/zenodo.4500976
NA	not listed	NA	<i>Agapornis personatus</i> Reichenow, 1887	2	In the Northern Cape, no permits to be issued for breeding, conveying, or trading, with permits for possession limited to birds that were already present in the Northern Cape prior to this prohibition coming into effect.	none	29 March 2022	no	10.5281/zenodo.6394393
NA	not listed	NA	<i>Agapornis roseicollis</i> (Vieillot 1818)	do not list	NA	consider for provincial listing	28 March 2022	no	10.5281/zenodo.6390407
<i>Agave sisalana</i> Perrine	2	none	as listed	2	none	none	5 December 2022	no	10.5281/zenodo.7400737
<i>Ageratina adenophora</i> (Spreng.) R.M.King & H.Rob. (= <i>Eupatorium adenophorum</i> Spreng.)	1b	none	<i>Ageratina adenophora</i> (Spreng.) R.M.King & H.Rob.	1b	none	none	19 December 2019	no	10.5281/zenodo.3585576
<i>Ailanthus altissima</i> (Mill.) Swingle	1b	none	as listed	1b	none	none	24 March 2020	no	10.5281/zenodo.3725649
NA	not listed	NA	<i>Alnus glutinosa</i> (L.) Gaertn.	1b	none	none	26 November 2020	no	10.5281/zenodo.4292204

regulatoryName	RegulatoryListing	Exemption or prohibition	Recommended regulatoryName	Recommended RegulatoryListing	Recommended exemptions or prohibitions	Notes	Date approved	Flagged for re-evaluation	DOI
<i>Ammotragus lervia</i> (Pallas, 1777)	2	none	<i>Ammotragus lervia</i> (Pallas, 1777)	2	none	none	16 January 2023	no	10.5281/zenodo.7540171
<i>Anas platyrhynchos</i> (Mallard)	2	none	<i>Anas platyrhynchos</i> (Linnaeus, 1758)	1b	exemptions outlined in an appendix	none	19 March 2020	no	10.5281/zenodo.3716165
<i>Antilope cervicapra</i> (Linnaeus, 1758)	2	none	as listed	2	none	none	1 March 2022	no	10.5281/zenodo.6319816
NA	not listed	NA	<i>Asphodelus fistulosus</i> L.	1a	none	none	20 July 2023	yes	10.5281/zenodo.8167476
<i>Atriplex inflata</i> F.Muell. (= <i>A. lindleyi</i> Moq. subsp. <i>inflata</i> (F.Muell.) Paul G.Wilson)	1b	none	<i>Atriplex lindleyi</i> Moq. subsp. <i>inflata</i> (F.Muell.) Paul G.Wilson	1b	none	none	19 May 2023	no	10.5281/zenodo.7950942
<i>Atriplex nummularia</i> Lindl. subsp. <i>Nummularia</i>	2	none	<i>Atriplex nummularia</i> Lindl. subsp. <i>nummularia</i>	2	none	none	19 May 2023	yes, by 2028	10.5281/zenodo.7950772
<i>Araujia sericifera</i> Brot.	1b	none	as listed	1b	none	none	22 April 2024	no	10.5281/zenodo.11034540
<i>Axis axis</i> (Erxleben, 1777)	2	none	as listed	2	none	none	30 March 2021	no	10.5281/zenodo.4647068
<i>Axis porcinus</i> (Zimmermann, 1780)	2	none	as listed	2	none	none	28 June 2021	no	10.5281/zenodo.5036222
<i>Bemisia tabaci</i> (Gennadius, 1889)	1b	none	<i>Bemisia tabaci</i> sensu lato	1b	none	none	11 January 2022	no	10.5281/zenodo.5837360
<i>Bos frontalis</i> Lambert, 1804	2	none	as listed	delist	NA	none	6 March 2024	no	10.5281/zenodo.10784527
<i>Boselaphus tragocamelus</i> (Pallas, 1766)	2	none	as listed	2	none	none	18 March 2022	no	10.5281/zenodo.6367289
Phasmatodea species (Jacobson and Blanchi, 1902)	1b	none	<i>Carausius morosus</i> (Sinety, 1901)	1b	none	none	15 March 2019	no	10.5281/zenodo.5027716
<i>Cardiospermum grandiflorum</i> Sw.	1b	none	as listed	1b	none	none	31 March 2022	no	10.5281/zenodo.6401160
<i>Cardiospermum halicacabum</i> L.	3	none	as listed	1b	none	none	27 July 2023	no	10.5281/zenodo.8188551
<i>Casuarina cunninghamiana</i> Miq.	various	none	as listed	2	plantings close to riparian areas or on untransformed land prohibited	none	22 October 2020	no	10.5281/zenodo.4118027



regulatoryName	RegulatoryListing	Exemption or prohibition	Recommended regulatoryName	Recommended RegulatoryListing	Recommended exemptions or prohibitions	Notes	Date approved	Flagged for re-evaluation	DOI
<i>Pennisetum setaceum</i> (Forssk.) Chiov.	various	none	<i>Cenchrus setaceus</i> (Forssk.) Morrone	1b	specified sterile cultivars / hybrids listed in the scope of exemption column exempted	none	5 September 2020	no	10.5281/zenodo.4019028
<i>Cervus elaphus</i> Linnaeus, 1758	2	none	as listed	2	none	common name to include both red deer and elk	21 September 2021	no	10.5281/zenodo.5518568
<i>Cervus nippon</i> Temminick, 1838	2	none	as listed	1b	none	none	22 December 2023	yes	10.5281/zenodo.10423443
<i>Chelydra serpentina</i> (Linnaeus, 1758)	2	none	as listed	2	none	none	20 March 2024	yes, by 2029	10.5281/zenodo.10844372
<i>Cherax cainii</i> (Austin & Ryan, 2002)	2	catch and release prohibited	<i>Cherax cainii</i> Austin and Ryan, 2002	2	catch and release prohibited	none	28 March 2022	yes, by 2027	10.5281/zenodo.6390199
<i>Cherax destructor</i> Clark 1936	1a	catch and release prohibited	as listed	1a	none	none	22 March 2024	yes, by 2029	10.5281/zenodo.10853369
<i>Cherax quadricarinatus</i> (von Martens, 1868)	1b	catch and release prohibited	as listed	1b	none	none	22 March 2024	no	10.5281/zenodo.10853501
<i>Cherax tenuimanus</i> (Smith, 1912)	2	catch and release prohibited	<i>Cherax tenuimanus</i> Smith, 1912	2	catch and release prohibited	none	28 March 2022	yes, by 2027	10.5281/zenodo.6390204
<i>Chondrilla juncea</i> L.	1a	none	as listed	1a	none	none	2 July 2019	yes, by 2024	10.5281/zenodo.4889844
<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob. (= <i>Eupatorium odoratum</i> L.)	1b	none	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	1b	none	none	29 April 2024	no	10.5281/zenodo.11082398
<i>Cinara cupressi</i> (Buckton, 1881)	1b	none	<i>Cinara cupressi</i> sensu lato	1b	none	none	30 September 2020	no	10.5281/zenodo.4059942
NA	not listed	NA	<i>Cistus ladanifer</i> L.	1a	none	none	23 March 2021	no	10.5281/zenodo.4630696
<i>Columba livia</i> (Gmelin, 1789)	various	various	<i>Columba livia</i> J.F.Gmelin, 1789	2	non-commercial food use exempt	none	16 March 2023	no	10.5281/zenodo.7739937

regulatoryName	RegulatoryListing	Exemption or prohibition	Recommended regulatoryName	Recommended RegulatoryListing	Recommended exemptions or prohibitions	Notes	Date approved	Flagged for re-evaluation	DOI
<i>Coreopsis lanceolata</i> L.	various	none	as listed	1b	none	whether sterile cultivars or hybrids should be listed was not analysed	18 November 2019	no	10.5281/zenodo.3582672
<i>Crassostrea gigas</i> (Thunberg, 1793)	2	various	<i>Magallana gigas</i> (Thunberg, 1793)	2	exemptions outlined in an appendix	The risk analysis recommended retaining the listing name as <i>Crassostrea gigas</i> but the nomenclature has changed since.	18 May 2018	no	10.5281/zenodo.4890068
NA	Not listed	NA	<i>Cygnus atratus</i> (Latham, 1790)	2	none	none	31 March 2023	no	10.5281/zenodo.7789281
<i>Cylindropuntia pallida</i> (Rose) F.M.Knuth	1a	none	as listed	1b	none	none	27 August 2021	no	10.5281/zenodo.5282733
<i>Cylindropuntia spinosior</i> (Engelm.) F.M. Knuth	1a	none	<i>Cylindropuntia imbricata</i> subsp. <i>spinosior</i> (Engelm.) M.A.Barker, Cloud-H. & Majure	1a	none	The risk analysis recommended retaining the listing name as <i>Cylindropuntia spinosior</i> but the nomenclature has changed since.	23 March 2022	yes, by 2027	10.5281/zenodo.6378994
<i>Cytisus scoparius</i> (L.) Link (= <i>Genista scoparia</i> (L.) Lam.)	1a	none	<i>Cytisus scoparius</i> (L.) Link	1a	none	none	31 March 2022	yes, by 2027	10.5281/zenodo.6400753
<i>Dama dama</i> (Linnaeus, 1758)	2	none	as listed	2	none	none	26 November 2020	no	10.5281/zenodo.4292277
NA	not listed	NA	<i>Desmodium uncinatum</i> (Jacq.) DC.	1b	none	none	5 February 2021	no	10.5281/zenodo.4506259
<i>Eucalyptus camaldulensis</i> Dehnh. and hybrids, varieties and selections	various	Exempted for an existing plantation	<i>Eucalyptus camaldulensis</i> Dehnh.	2	exemptions outlined in an appendix	none	27 January 2021	no	10.5281/zenodo.4471376
<i>Eugenia uniflora</i> L.	1b	none	as listed	1b	trees planted prior to 2014 in urban areas more than 100m from riparian areas or untransformed land are exempt	none	6 March 2020	no	10.5281/zenodo.3698952

regulatoryName	RegulatoryListing	Exemption or prohibition	Recommended regulatoryName	Recommended RegulatoryListing	Recommended exemptions or prohibitions	Notes	Date approved	Flagged for re-evaluation	DOI
NA	not listed	NA	<i>Euwallacea fornicatus</i> (Eichhoff, 1868)	1b	none	none	10 July 2021	no	10.5281/zenodo.5089866
NA	not listed	NA	<i>Fusarium euwallaceae</i> S. Freeman, Z. Mendel, T. Aoki & O'Donnell	1b	none	none	10 July 2021	no	10.5281/zenodo.5089866
<i>Gambusia affinis</i> (Baird and Girard, 1853)	various	various	<i>Gambusia affinis</i> (Baird & Girard, 1853)	1b	none	none	30 March 2022	no	10.5281/zenodo.6396921
<i>Hydrochoerus hydrochaeris</i> (Linnaeus, 1766)	2	none	as listed	1b	none	none	30 March 2021	yes, by 2026	10.5281/zenodo.4646949
<i>Hydrocleys nymphoides</i> (Humb. & Bonpl. ex Willd.) Buchenau	1a	none	as listed	1a	none	reassessment in five years after an eradication feasibility study	26 April 2024	yes, by 2029	10.5281/zenodo.11072404
<i>Hypericum perforatum</i> L.	2	none	as listed	2	none	none	21 October 2020	no	10.5281/zenodo.4115921
<i>Iguana iguana</i> (Linnaeus, 1758)	various	none	as listed	2	No permits to be issued to import, possess, breed, convey, and trade <i>I. iguana</i> in the Eastern Cape and KwaZulu-Natal.	none	6 April 2023	no	10.5281/zenodo.7805429
<i>Iris pseudacorus</i> L.	1a	none	as listed	1b	none	none	26 November 2019	no	10.5281/zenodo.3582192
<i>Jatropha curcas</i> L.	2	none	as listed	1b	none	none	18 December 2019	no	10.5281/zenodo.3582785
<i>Bryophyllum delagoense</i> (Eckl. & Zeyh.) Schinz (= <i>B. tubiflorum</i> Harv., <i>Kalanchoe tubiflora</i> (Harv.) Raym.-Hamet, <i>K. delagoensis</i> Eckl. & Zeyh.)	1b	none	<i>Kalanchoe delagoensis</i> Eckl. & Zeyh.	1b	none	The risk analysis recommended using the name <i>Kalanchoe tubiflora</i> (Harv.) Raym.-Hamet but the nomenclature has changed since ( <a href="https://powo.science.kew.org">https://powo.science.kew.org</a> , accessed 30 Aug 2023)	29 September 2020	no	10.5281/zenodo.4058512

regulatoryName	RegulatoryListing	Exemption or prohibition	Recommended regulatoryName	Recommended RegulatoryListing	Recommended exemptions or prohibitions	Notes	Date approved	Flagged for re-evaluation	DOI
<i>Kobus ellipsiprymnus crawshayi</i> (P. L. Slater, 1894)	2	none	<i>Kobus ellipsiprymnus</i> (Ogilby, 1833) subsp. <i>defassa</i> (Rüppell, 1835)	1a	none	It is recommended that <i>Kobus ellipsiprymnus</i> subsp. <i>crawshayi</i> (currently listed as a separate subspecies) be considered as an ecotype of <i>K. e. subsp. defassa</i> and listed under a single listing	31 March 2023	no	10.5281/zenodo.7788400
<i>Kobus ellipsiprymnus defassa</i> (Rüppell, 1835).	2	none	<i>Kobus ellipsiprymnus</i> (Ogilby, 1833) subsp. <i>defassa</i> (Rüppell, 1835)	1a	none	none	31 March 2023	yes, by 2028	10.5281/zenodo.7788332
<i>Kobus leche kafuensis</i> Haltenorth, 1963	2	none	<i>Kobus leche</i> Gray, 1850 subsp. <i>kafuensis</i> Haltenorth, 1963	2	none	none	31 March 2023	no	10.5281/zenodo.7788284
<i>Kobus leche leche</i> Gray, 1850	2	none	<i>Kobus leche</i> Gray, 1850 subsp. <i>leche</i> Gray, 1850	2	none	The risk analysis recommended using the name <i>Kobus leche</i> subsp. <i>leche</i> Gray, 1850. For consistency the suggestion is to include the authorities for both the species and subspecies	25 March 2022	no	10.5281/zenodo.6384051
<i>Kobus vardonii</i> (Livingstone, 1857)	2	none	as listed	2	none	none	31 March 2023	yes, by 2028	10.5281/zenodo.7788232
<i>Kunzea ericoides</i> (A.Rich.) Joy Thomps. (= <i>Leptospermum ericoides</i> A. Rich.)	1a	none	<i>Kunzea ericoides</i> (A.Rich.) Joy Thomps.	1a	none	none	30 March 2021	yes, by 2026	10.5281/zenodo.4647555
<i>Lilium formosanum</i> Wallace (= <i>L. longiflorum</i> Thunb. var. <i>formosanum</i> Baker)	1b	none	<i>Lilium formosanum</i> A.Wallace	1b	none	none	29 March 2019	no	10.5281/zenodo.4756205
NA	Not listed	NA	<i>Lymantria dispar</i> Linnaeus, 1758	prohibited list	NA	none	17 Jan 2023	no	10.5281/zenodo.7544043
<i>Lythrum salicaria</i> L.	1a	none	as listed	1a	none	none	17 Mar 2022	no	10.5281/zenodo.6365645
<i>Melaleuca hypericifolia</i> Sm.	1a	none	as listed	1b	none	none	12 Feb 2019	no	10.5281/zenodo.4756290

regulatoryName	RegulatoryListing	Exemption or prohibition	Recommended regulatoryName	Recommended RegulatoryListing	Recommended exemptions or prohibitions	Notes	Date approved	Flagged for re-evaluation	DOI
<i>Micropterus dolomieu</i> (Lacepède, 1802)	various	various	<i>Micropterus dolomieu</i> Lacepède, 1802	2	exemptions and prohibitions outlined in an appendix	none	30 Mar 2023	no	10.5281/zenodo.7785981
<i>Micropterus floridanus</i> (Lesueur, 1822)	various	various	as listed	2	exemptions and prohibitions outlined in an appendix	none	30 Mar 2023	no	10.5281/zenodo.7786385
<i>Micropterus floridanus</i> (Lesueur, 1822) x <i>Micropterus salmoides</i> (Lacepède, 1802)	various	various	as listed	do not list	NA	already listed as parental taxa are both listed	30 Mar 2023	no	10.5281/zenodo.7786460
<i>Micropterus punctulatus</i> (Rafinesque, 1819)	various	various	as listed	2	exemptions and prohibitions outlined in an appendix	none	30 Mar 2023	no	10.5281/zenodo.7786135
<i>Micropterus salmoides</i> (Lacepède, 1802)	various	various	as listed	2	exemptions and prohibitions outlined in an appendix	none	30 Mar 2023	no	10.5281/zenodo.7786419
<i>Morelia spilota</i> (Lacépède, 1804)	2	none	as listed	2	none	none	21 Mar 2021	no	10.5281/zenodo.4630458
<i>Murraya paniculata</i> (L.) Jack. (= <i>M. exotica</i> L.)	various	none	as listed	1b	a) breeding in nurseries in KZN, LP, MP is exempt; b) not listed in EC, FS, G, NC, NWP, WC; c) sterile cultivars or hybrids are not listed	none	16 April 2024	yes, by 2029	10.5281/zenodo.10977000
<i>Myocastor coypus</i> (Molina, 1782)	2	Prohibited for Restricted Activity (c): "Growing, breeding or in any other way propagating any specimen of a listed invasive species, or causing it to multiply."	as listed	prohibited list	NA	none	30 April 2019	no	10.5281/zenodo.4756375

regulatoryName	RegulatoryListing	Exemption or prohibition	Recommended regulatoryName	Recommended RegulatoryListing	Recommended exemptions or prohibitions	Notes	Date approved	Flagged for re-evaluation	DOI
<i>Mytilus galloprovincialis</i> (Lamarck, 1819)	2	various	<i>Mytilus galloprovincialis</i> Lamarck, 1819	2	none	none	15 March 2019	no	10.5281/zenodo.4756489
<i>Nasturtium officinale</i> R.Br. (= <i>Rorippa nasturtium-aquaticum</i> (L.) Hayek)	2	none	<i>Nasturtium officinale</i> W.T.Aiton	2	the harvesting of naturalised populations for human consumption or medicinal purposes is exempt providing it does not involve the spread of seeds or rhizomatous material	none	22 Aug 2023	no	10.5281/zenodo.8271840
<i>Nephrolepis cordifolia</i> (L.) C.Presl (= <i>Polypodium cordifolium</i> L.)	various	none	<i>Nephrolepis cordifolia</i> (L.) C.Presl	1b	none	none	28 Mar 2022	no	10.5281/zenodo.6390820
<i>Nephrolepis exaltata</i> (L.) Schott (= <i>Polypodium exaltatum</i> L.)	various	none	<i>Nephrolepis exaltata</i> L. (Schott)	1b	none	none	28 Mar 2022	yes, by 2027	10.5281/zenodo.6390824
<i>Nerium oleander</i> L.	various	none	as listed	1b	none	none	27 May 2020	no	10.5281/zenodo.3859982
<i>Nymphoides peltata</i> (S.G.Gmel.) Kuntze (= <i>Limnanthemum peltatum</i> S.G.Gmel.)	1a	none	<i>Nymphoides peltata</i> (S.G.Gmel.) Kuntze	1a	none	none	12 Jan 2023	no	10.5281/zenodo.7529731
NA	not listed	NA	<i>Oncorhynchus mykiss</i> (Walbaum, 1792)	2	catch-and-release is exempt in areas specified in maps produced as part of a National Management Plan for <i>O. mykiss</i>	none	26 Mar 2022	no	10.5281/zenodo.6386318
<i>Opuntia stricta</i> (Haw.) Haw. var. <i>stricta</i> and var. <i>dillenii</i> (Ker Gawl.) L.D.Benson (= <i>O. dillenii</i> (Ker Gawl.)Haw.)	1b	none	<i>Opuntia stricta</i> (Haw.) Haw.	1b	none	none	29 Mar 2023	no	10.5281/zenodo.7780505.
<i>Oreochromis niloticus</i> (Linnaeus, 1758)	various	various	as listed	2	none	none	11 Dec 2018	no	10.5281/zenodo.4896423
<i>Oryx dammah</i> (Cretzschmar, 1827)	2	none	as listed	1b	none	none	3 Feb 2022	no	10.5281/zenodo.5958264

regulatoryName	RegulatoryListing	Exemption or prohibition	Recommended regulatoryName	Recommended RegulatoryListing	Recommended exemptions or prohibitions	Notes	Date approved	Flagged for re-evaluation	DOI
<i>Ovis aries musimon</i> Pallas, 1762	2	none	<i>Ovis aries</i> Linnaeus, 1758 subsp. <i>musimon</i> (Pallas, 1811)	2	none	none	26 Jul 2023	no	10.5281/zenodo.8186434
<i>Oxyura jamaicensis</i> (Gmelin, 1789)	2	none	<i>Oxyura jamaicensis</i> (J. F. Gmelin, 1789)	1a with management for efforts implemented	none	none	8 Feb 2024	no	10.5281/zenodo.10634437
<i>Pacifastacus leniusculus</i> (Dana, 1852)	1a	none	as listed	1a	none	none	22 Mar 2024	yes, by 2029	10.5281/zenodo.10853191
<i>Parthenium hysterophorus</i> L.	1b	none	as listed	1b	none	none	28 Sep 2021	no	10.5281/zenodo.5534201
<i>Paspalum quadrifarium</i> Lam.	1a	none	as listed	1b	none	none	11 Dec 2018	no	10.5281/zenodo.4896500
<i>Fenneropenaeus indicus</i> (H. Milne Edwards, 1837)	various	none	<i>Penaues indicus</i> (H. Milne Edwards, 1837)	do not list	NA	native to a part of South Africa	29 March 2019	no	10.5281/zenodo.4896560
NA	not listed	NA	<i>Phyllostachys aurea</i> Rivière & C.Rivière	1b	none	none	30 Sep 2020	no	10.5281/zenodo.4059290
<i>Populus alba</i> L.	2	none	as listed	2	none	none	31 Mar 2021	yes	10.5281/zenodo.4650396
<i>Populus x canescens</i> (Aiton) Sm.	2	none	as listed	2	none	none	31 Mar 2021	yes	10.5281/zenodo.4650400
<i>Procambarus clarkii</i> (Girard, 1852)	not listed	none	as listed	1b	none	none	9 Feb 2024	no	10.5281/zenodo.10638441
<i>Psidium cattleianum</i> Sabine (= <i>P. littorale</i> Raddi var. <i>longipes</i> (O.Berg.) Fosberg)	1b	none	<i>Psidium cattleianum</i> Sabine	1b	none	none	30 Nov 2018	no	10.5281/zenodo.4756847
<i>Psidium guajava</i> L.	various	none	as listed	2	a) The fruit of guava is not listed if used for human consumption; and b) Guava is exempt in the Free State, Gauteng, Northern Cape, North-West Province, and the Western Cape.	none	27 March 2024	no	10.5281/zenodo.10888266
<i>Psittacula krameri</i> (Scopoli, 1769)	2	various	as listed	1b	none	none	18 May 2018	no	10.5281/zenodo.5026977

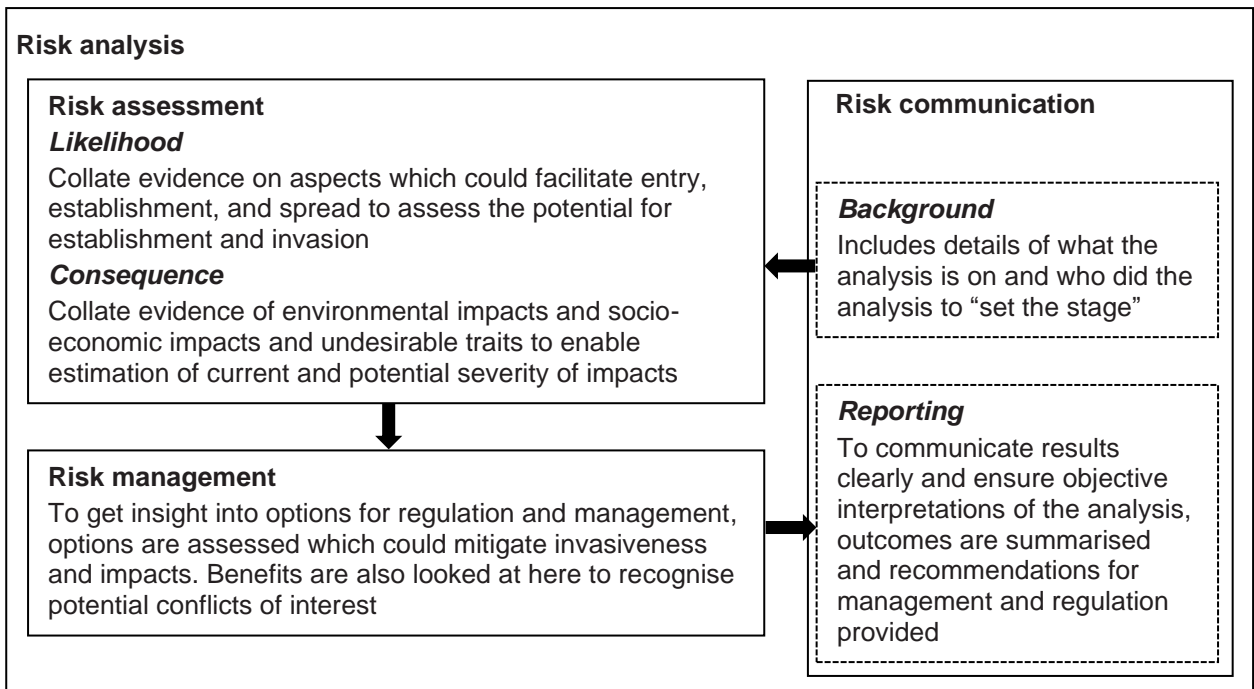
regulatoryName	RegulatoryListing	Exemption or prohibition	Recommended regulatoryName	Recommended RegulatoryListing	Recommended exemptions or prohibitions	Notes	Date approved	Flagged for re-evaluation	DOI
<i>Pueraria montana</i> (Lour.) Merr. var. <i>lobata</i> (Willd.) Maesen & S.M.Almeida (= <i>P. lobata</i> (Willd.) Ohwi)	1a	none	<i>Pueraria montana</i> (Lour.) Merr. var. <i>lobata</i> (Willd.) Maesen & S.M.Almeida ex Sanjappa & Predeep	1a	none	none	9 Feb 2022	yes	10.5281/zenodo.6024210
<i>Pycnonotus cafer</i> (Linnaeus, 1766)	2	none	as listed	1a	none	none	30 Nov 2018	no	10.5281/zenodo.4756881
<i>Pyracantha angustifolia</i> (Franch.) C.K.Schneid.	1b	none	as listed	1b	none	none	29 April 2024	no	10.5281/zenodo.11085948
<i>Python natalensis</i> x <i>Python molurus</i>	1a	none	NA	do not list	NA	taxon does not exist, if it did it would already be listed	23 March 2022	no	10.5281/zenodo.6378454
<i>Rattus norvegicus</i> (Berkenhout, 1769)	various	none	as listed	various	exempt for use in the pet / exhibit trade (including for use as feed) and for research or educational purposes	proposed to be listed as 1b on the mainland and 1a on offshore islands. the exemption was included in the recommended category but should have been elsewhere	10 January 2022	no	10.5281/zenodo.5834153
<i>Rattus rattus</i> (Linnaeus, 1758)	various	none	as listed	various	none	proposed to be listed as 1b on the mainland and 1a on offshore islands	27 January 2021	no	10.5281/zenodo.4472180
<i>Rattus tanezumi</i> Temminck, 1844	various	none	<i>Rattus tanezumi</i> (Temminck, 1845)	various	none	proposed to be listed as 1b on the mainland and 1a on offshore islands	10 January 2022	no	10.5281/zenodo.5834014
NA	not listed	NA	<i>Rhinella marina</i> (Linnaeus, 1758)	1a	none	none	23 March 2022	no	10.5281/zenodo.6378801
<i>Ricinus communis</i> L.	2	none	as listed	2	none	none	18 December 2019	yes, by 2024	10.5281/zenodo.3582889
<i>Robinia pseudoacacia</i> L.	1b	none	as listed	1b	none	none	18 May 2018	no	10.5281/zenodo.5027151



regulatoryName	RegulatoryListing	Exemption or prohibition	Recommended regulatoryName	Recommended RegulatoryListing	Recommended exemptions or prohibitions	Notes	Date approved	Flagged for re-evaluation	DOI
<i>Rosa rubiginosa</i> L. (= <i>R. eglantheria</i> L.)	1b	none	<i>Rosa rubiginosa</i> L.	1b	the harvesting of rosehips from invasive and naturalised populations along the Maloti-Drakensberg mountain region for the purpose of subsistence livelihoods is exempt providing it does not involve the spread of rhizomatous material	none	20 March 2024	no	10.5281/zenodo.10844045
<i>Rosa unicolor</i> (Kerr, 1792)	2	none	<i>Rosa unicolor</i> (Kerr, 1792)	1b	none	none	23 March 2021	yes, by 2026	10.5281/zenodo.4630790
<i>Sagittaria platyphylla</i> (Engelm.) J.G.Sm.	1a	none	<i>Sagittaria platyphylla</i> (Engelm.) J.G.Sm.	1b	none	none	29 March 2019	no	10.5281/zenodo.5027351
NA	Not listed	NA	<i>Salmo trutta</i> Linnaeus, 1758	2	catch-and-release is exempt in areas specified in maps produced as part of a National Management Plan for <i>S. trutta</i> . Permits will only be issued for particular species at designated sites as outlined in a national management plan for the group. Exemptions: a. The stocking of dams (farm or public) in catchments where the species already occurs providing such dams are not either in or upstream of Important Fish Areas (FEPA "fish sanctuaries"). b. Catch and release providing such release is at the same site as where the fish was caught. Catch and kill is strongly encouraged at any sites where stocking is not permitted or exempt.	none	31 March 2023	no	10.5281/zenodo.7789150

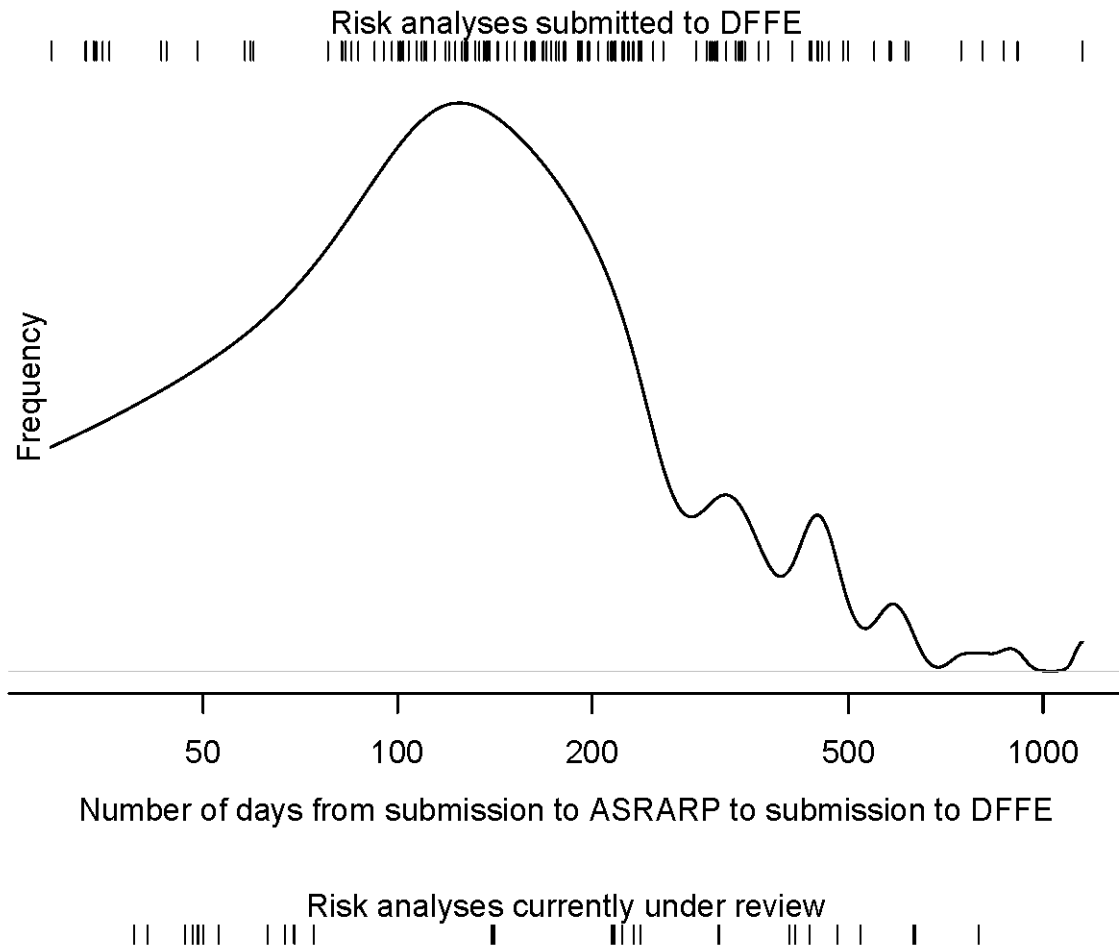
regulatoryName	RegulatoryListing	Exemption or prohibition	Recommended regulatoryName	Recommended RegulatoryListing	Recommended exemptions or prohibitions	Notes	Date approved	Flagged for re-evaluation	DOI
<i>Sasa ramosa</i> (Makino) Makino & Shibata (= <i>Arundinaria vagans</i> Gamble)	3	none	<i>Sasaella ramosa</i> (Makino) Makino	do not list	NA	The risk analysis recommended using the name <i>Sasa ramosa</i> (Makino) Makino & Shibata but the nomenclature has changed since	12 Feb 2019	no	10.5281/zenodo.5027451
<i>Hylocereus undatus</i> (Haw.) Britton & Rose	various	none	<i>Selenicereus undatus</i> Haw. & D.R.Hunt	2	permits may only be issued for commercial fruit production; the fruit of Dragon fruit is not listed if used for human consumption	none	2 August 2021	no	10.5281/zenodo.5153307
<i>Senna bicapsularis</i> (L.) Roxb. (= <i>Cassia bicapsularis</i> L.)	1b	none	<i>Senna bicapsularis</i> (L.) Roxb.	1b	none	none	29 March 2019	no	10.5281/zenodo.5027534
<i>Solanum mauritianum</i> Scop.	1b	none	as listed	1b	none	The risk analysis recommended using the name <i>Solanum mauritianum</i> Scopoli but an abbreviated authority is used on POWO	1 Sep 2020	no	10.5281/zenodo.4018939
<i>Sorghum halepense</i> (L.) Pers.	2	none	as listed	1b	none	none	31 Mar 2022	no	10.5281/zenodo.6400942
<i>Spartium junceum</i> L.	various	none	as listed	1b	none	none	3 Feb 2022	no	10.5281/zenodo.5959982
NA	not listed	NA	<i>Sphaeropteris cooperi</i> (F. Muell.) R.M. Tryon	1b	none	none	30 Nov 2018	no	10.5281/zenodo.5027595
<i>Sus scrofa</i> Linnaeus, 1758	various	none	as listed	1b	exemption for any animal in captivity or free-roaming for which there is clear evidence of ownership	none	27 March 2024	no	10.5281/zenodo.10887690
<i>Syzygium jambos</i> (L.) Alston	3	none	as listed	1b	individual trees planted by humans in cultivated areas outside of riparian zones prior to 2014 are exempt	The risk analysis recommended using the name <i>Syzygium jambos</i> L. Alston but the bracketing of the first authority is missing	24 March 2020	no	10.5281/zenodo.3726026

regulatoryName	RegulatoryListing	Exemption or prohibition	Recommended regulatoryName	Recommended RegulatoryListing	Recommended exemptions or prohibitions	Notes	Date approved	Flagged for re-evaluation	DOI
<i>Tetrapygus niger</i> (Molina, 1782)	1a	none	as listed	prohibited list	NA	none	19 June 2023	no	10.5281/zenodo.8054725
<i>Tithonia diversifolia</i> (Hemsl) A. Gray	1b	none	as listed	1b	none	none	21 October 2020	no	10.5281/zenodo.4115995
<i>Ulex europaeus</i> L.	1a	none	as listed	1a	none	none	17 May 2023	yes, by 2028	10.5281/zenodo.7944132
<i>Vespula germanica</i> (Fabricius, 1793)	1b	none	as listed	1b	none	none	30 April 2019	no	10.5281/zenodo.4756059



Source: adapted from (Kumschick et al. 2020a)

**Supplementary figure 1:** Aspects of risk addressed by the Risk Analysis for Alien Taxa (RAAT) framework.



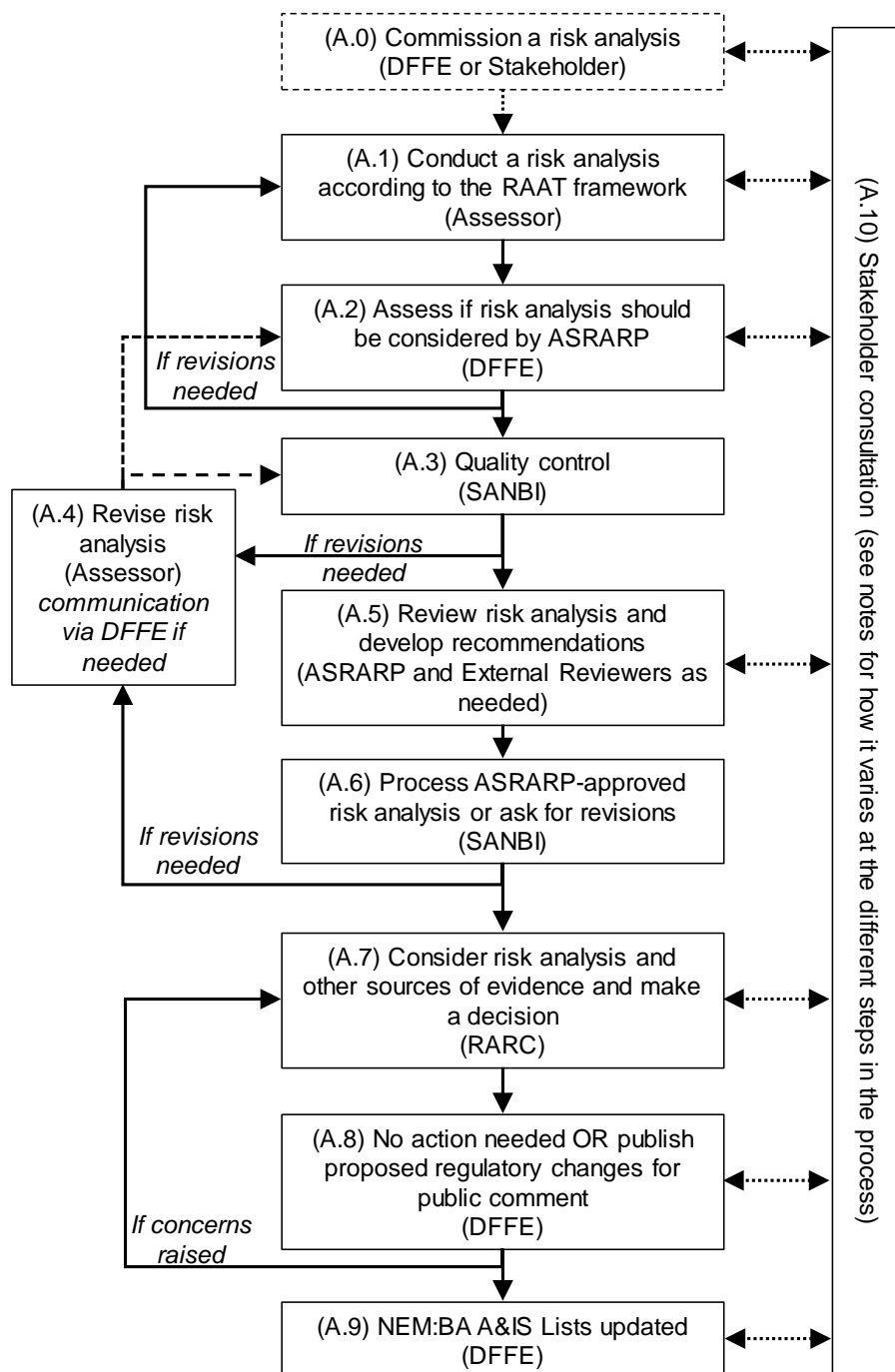
**Supplementary figure 2:** The time taken to review risk analyses as of 30 April 2024.

Specifically, it is the time between when a risk analysis was submitted by the South African National Biodiversity Institute (SANBI) to the Alien Species Risk Analysis Review Panel (ASRARP) for review and when the risk analysis approved by ASRARP was submitted to SANBI for submission to the Department of Forestry, Fisheries and the Environment (DFFE) and theretofore consideration by the Risk Analysis Review Committee (RARC). Given the RARC has only recently been set up it is not possible to evaluate the time between submission to the RARC and any change to the National Environmental Management: Biodiversity Act (NEM:BA) Alien and Invasive Species (A&I) Lists. One risk analysis that took 8 days to process is not shown (*Micropterus floridanus* x *Micropterus salmoides*). This risk analysis was very quick to process due to a technicality—the listing of the hybrid was regarded as redundant as both parental taxa are similarly listed, and under NEM:BA of 2004 a “species” is defined as including “...any sub-species, cultivar, variety, geographic race, strain, hybrid or geographically separate population”.

**Supplementary material 1:** The process for making regulatory decisions concerning alien taxa in South Africa [under the National Environmental Management: Biodiversity Act (NEM:BA), Alien and Invasive Species (A&IS) Regulations of 2014 as amended 2020] as understood by the authors.

Please note this is not an official documented process and is for the purposes of interpretation only. A) The process for revising the regulated list of invasive taxa in South Africa. B) The process for dealing with requests to import alien taxa not currently legally present in the country. C) A summary of the process for importing biological control agents. ASRARP is the Alien Species Risk Analysis Review Panel; DALRRD is the Department of Agriculture, Land Reform, and Rural Development; DFFE is the South African National Department of Forestry, Fisheries and the Environment; NBCRARC is the National Biological Control Release Application Review Committee; RAAT is the Risk Analysis of Alien Taxa framework; RARC is the Risk Analysis Review Committee; SANBI is the South African National Biodiversity Institute.

**A. The process for revising the regulated list of invasive taxa in South Africa**



### *Step (A.0) Commission a risk analysis*

Most risk analyses completed to date were because DFFE asked SANBI to facilitate them (i.e. DFFE devolved steps A.0 and A.2 to SANBI). The initial priorities were: taxa for which most permits had been issued or there was some controversy surrounding their listing; and taxa that SANBI have been mandated by DFFE to facilitate their control [category 1a and Species Under Surveillance for Potential Eradication or Containment Targeting (SUSPECT) taxa in particular, (Wilson et al. 2013)]. However, the broader aim is to ensure all taxa currently listed in the regulations have a risk analysis completed on them (Department of Environment, Forestry and Fisheries 2020a). Risk analyses have been done either by SANBI staff, post-graduate students, or post-docs, or by people mandated or contracted by DFFE to conduct research on biological invasions. Many, but not all, participated in the risk analysis training course. However, any stakeholder who wishes to make a submission to change the current listing can conduct or commission a risk analysis according to the RAAT framework and ask DFFE to consider it.

*Stakeholder engagement (A.0):* the choice of which risk analysis to work on has been largely in response to how stakeholders are interacting with the lists, with the need to prioritise a risk analysis based on requests for permits or in response to direct requests for changes. In the latter case, the process provides stakeholders with a clear process as to how to motivate for such changes.

### *Step (A.1) Conduct a risk analysis according to the RAAT framework*

The Assessor produces a risk analysis report according to the Risk Analysis for Alien Taxa (RAAT) framework (Kumschick et al. 2020b) and submits it to DFFE or SANBI directly if DFFE has already confirmed they are happy for ASRARP resources to be used reviewing such a risk analysis. On submission of a risk analysis report, the contents of the risk analysis can then be used, revised, updated, and published by DFFE and SANBI even if the Assessor subsequently withdraws their submission, noting that the Assessor retains the right to be identified as involved in the risk analysis report even if they might not agree with the final contents of the risk analysis report.

*Stakeholder engagement (A.1):* the Assessor is encouraged to get advice and information from experts to confirm factual details of a risk analyses and request links to published information. This is usually an ad hoc process, and not stakeholder engagement per se.

### *Step (A.2) Assess if risk analysis should be considered by ASRARP*

Anyone may produce a risk analysis report according to the RAAT framework, but DFFE retains the right to decide if it is sent to SANBI for scientific review. DFFE provides the funding for ASRARP via SANBI, and DFFE determines which issues ASRARP can consider (noting that ASRARP is otherwise independent in how it operates). If DFFE chooses not to ask SANBI to review a risk analysis report, they may request revisions, return a submission stating why it will not be considered further, or ask the RARC to directly consider the evidence (without ASRARP review, though such evidence would not then be considered an independent peer-reviewed risk analysis).

*Stakeholder engagement (A.2):* the DFFE might directly consult stakeholders or use responses received in previous stakeholder engagement to make their decision as to whether to progress with the listing.

### *Step (A.3) Quality control*

On receiving a risk analysis report for review, SANBI officials first check to see if all sections are complete according to the framework and that the recommendation is consistent with the framework. Significant omissions in terms of evidence might also be identified at this stage. In all cases to date, if revisions are recommended, SANBI has communicated directly with the Assessor, but in sensitive situations communication might need to go through DFFE.

### *Steps (A.4) Revise risk analysis*

The Assessor takes the comments provided (either during quality control, or after ASRARP has reviewed the report) revises the risk analysis report and submits the revised report and a document outlining how each point raised has been addressed. There may be several rounds of revision and engagement with SANBI before a risk analysis report is (re-)submitted to ASRARP. The Assessor may choose to stop being involved in the process if they believe they cannot agree on a recommendation with ASRARP. However, SANBI may continue to facilitate the risk analysis report so that the considerations made by ASRARP and any external reviewers are appropriately captured and used to inform future decisions.

#### *Step (A.5) Review risk analysis and develop recommendations*

The ASRARP Secretariat evaluates the risk analysis report and assigns an ASRARP member to handle its review. The ASRARP member handling the review of a risk analysis evaluates the report and, as appropriate, solicits at least two external reviews. The External Reviewers are meant to focus on the technical content including whether the best available evidence is used, and that all relevant issues are raised. By contrast, the ASRARP handling member focuses on whether the RAAT framework is adhered to (unless they are also an expert on the taxa in question). External Reviewers are expected to be experts on the taxon or similar taxa and have an understanding of biological invasions. Ideally one of the External Reviewers should have knowledge of invasions outside of South Africa or of the taxa in its native range (i.e. usually an international expert). Risk analyses may also be submitted to a relevant national working group on a particular taxon that is the focus of the risk analysis report [e.g. the Cactus Working Group (Kaplan et al. 2017), the Alien Grass Working Group (Visser et al. 2017), or the CAPE invasive animal working group (Davies et al. 2020), see Foxcroft et al. (2020) for other such groups]. A review by such a working group can be considered to be one of the two required external reviews. ASRARP members may not act as external reviewers.

The handling member then presents the risk analysis report for discussion at a meeting of ASRARP. Such discussions typically take 20–90 minutes per taxon. Following discussion at the meeting a decision will be reached to either: a) recommend that the risk analysis report is accepted as is; b) recommend that the risk analysis report be approved subject to changes made to the satisfaction of the handling member and the ASRARP Chair providing any outstanding external reviews substantively agree with ASRARP's recommendations; or c) recommend that the risk analysis report be revised and discussed again at a subsequent meeting. ASRARP may also recommend the addition of an appendix that outlines (in more detail than required by the RAAT framework) the rationale for a recommendation, in particular focussing on any exemptions or permit conditions proposed.

The handling member then produces a consolidated review report of their own comments, the comments from the external reviewers, and the discussion at the ASRARP meeting. Such a consolidated review report indicates ASRARP's recommendation in terms of whether and how the taxon should be listed, whether any recommendations for permit conditions or exemptions should be considered, and highlights key areas of uncertainty where further information or research is needed.

If revisions are required, SANBI then sends the consolidated review report to the Assessor (through DFFE as necessary), and, as appropriate, SANBI will engage with the Assessor to facilitate the revision of the risk analysis report (see Step 4 above). If revisions are not required, then the process carries on to Step 6 below.

*Stakeholder engagement (A.5):* during the review of the risk analysis, external reviewers and appropriate working groups are consulted, though often specific stakeholders will also be consulted to check the completeness and accuracy of various aspects of the risk analyses. Again this is not a broad comprehensive stakeholder engagement, but serves as a check of the factual accuracy of the risk analysis.

#### *Step (A.6) Process ASRARP-approved risk analysis or ask for revisions*

When both the Assessor and ASRARP have agreed that a risk analysis report is acceptable, SANBI provides a final quality and formatting check and uploads the document to an on-line storage system ([www.zenodo.org](http://www.zenodo.org)) where it is assigned a digital object identifier (doi). The doi means that the risk analysis cannot subsequently be changed without it being registered as a new version. The risk analysis report is then submitted to DFFE for discussion at the RARC. The documents are, as of March 2024, not placed in the public domain (i.e. access is closed), though the intention is to make all risk analyses publicly accessible once the RARC has had an opportunity to consider and react to their recommendations and perform a proper stakeholder engagement process where needed.

#### *Step (A.7) Consider risk analysis and other sources of evidence and make a decision*

At this step the RARC take the risk analysis report accepted by ASRARP as one source of evidence for consideration. Other sources of evidence may include direct submissions from stakeholders and written opinions from other affected governmental organisations (e.g. relevant provincial authorities). The RARC take all sources of evidence in the context of national imperatives and the legal framework of both NEM:BA and other regulations and policies, and arrive at a decision at a meeting.

*Stakeholder engagement (A.7):* The intention of RARC is to have representation from all relevant governmental organisations, but additional written consultation may be solicited. DFFE, might, as part of the input to the RARC process, also solicit input from other (non-governmental) stakeholders, and initiate meetings with those stakeholders to discuss any concerns they might have.



*Step (A.8) No action needed OR publish proposed regulatory changes for public comment*

The decision taken by the RARC will, as necessary, be sent to the DFFE's legal advisors to confirm that the proposal is legitimate, and any proposed revisions to the lists will be published in the Government Gazette for public comment. There is no set schedule for the publication of proposed revisions to the listing, but it is envisaged that this would be done at most twice a year with separate provision for publishing emergency changes to the lists. The RARC will then consider public comments (and DFFE's response to them), and then potentially DFFE will publish any amendments in the Government Gazette for public comment.

*Stakeholder engagement (A.8):* there is a formal mandated requirement to publish regulatory changes for public comment. DFFE facilitates this process and can have specific consultations during this period. DFFE will consider the comments received and respond to them accordingly.

*Step (A.9) NEM:BA A&IS Lists updated*

DFFE publishes revised lists for implementation.

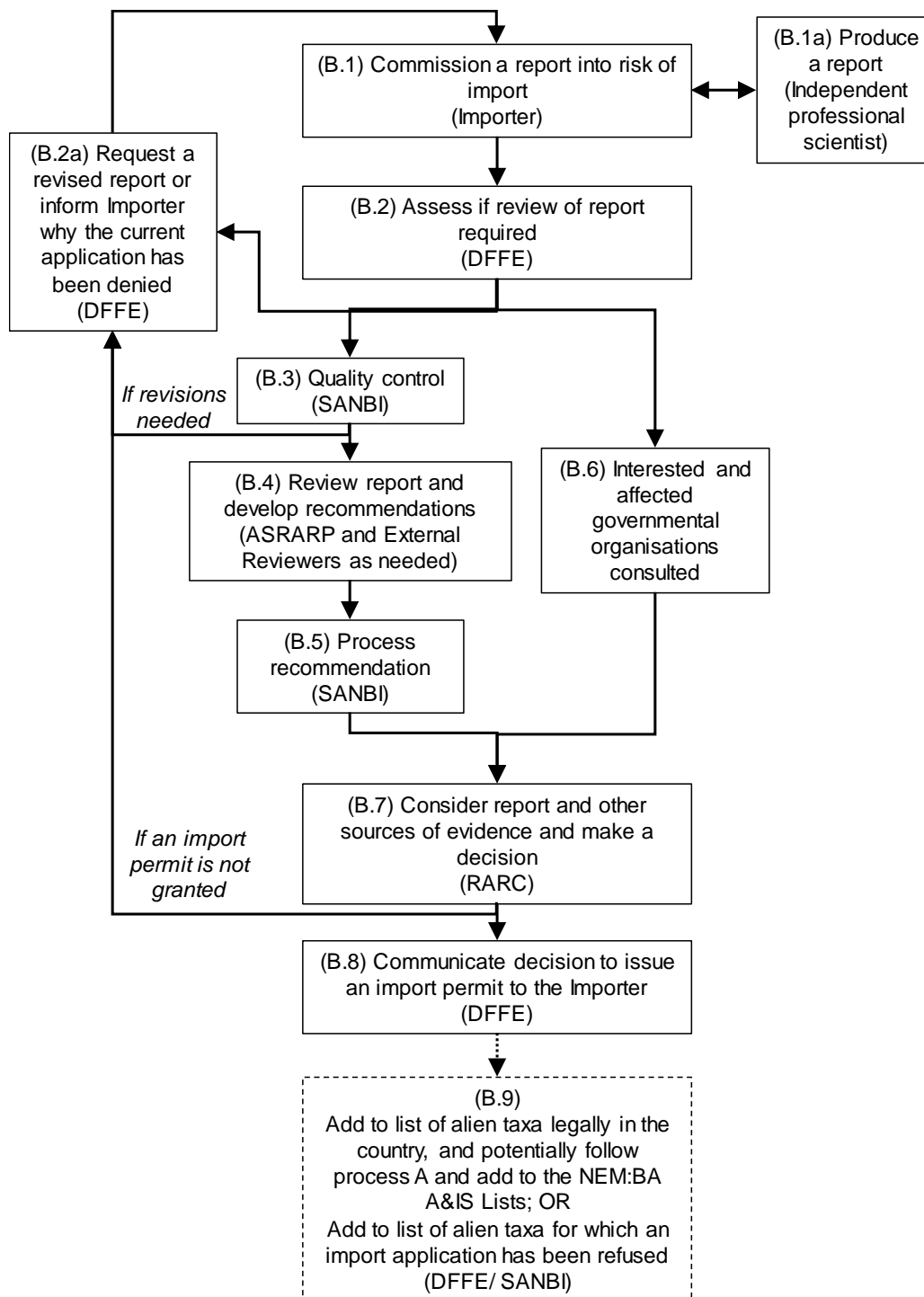
*Stakeholder engagement (A.9):* the views of stakeholders should have been considered prior to revising the lists, however, stakeholder consultation does not stop here. After the regulations come into effect, stakeholder engagement (facilitated by the DFFE) is needed to increase awareness and improve compliance. Moreover, monitoring (again facilitated by the DFFE) is needed so that the appropriateness and efficacy of the regulations can be assessed. Such monitoring of interventions is key if management and policy are to be adaptive (Wilson et al. 2018).

*Step (A.10) Stakeholder consultation*

Stakeholder consultation is listed as step 10 here, but, as noted in the other steps, in reality it is integral throughout the process: by those commissioning a risk analysis; by the Assessor conducting a risk analysis; by DFFE assessing whether a risk analysis should be considered; during the review of the risk analysis by ASRARP; during the decision making process by the RARC; and by DFFE when publishing revised lists for public comment and after promulgating any such revisions.

DFFE consult industry that might be affected by proposed changes before publishing for public comment. Various tools are available for stakeholder engagement, some of which specifically focus on engagement during the management of biological invasions (Novoa et al. 2018).

**B. The process for dealing with requests to import alien taxa not currently legally present in the country**



*Step (B.1) Commission a report into risk of import*

Anybody wishing to import a taxon not currently present in the country must commission a report outlining the risks posed in line with paragraph 16 of the NEM:BA A&IS Regulations of 2020 (Department of Environment, Forestry and Fisheries 2020b). Such a report is largely similar in content to a risk analysis report conducted according to the RAAT framework, though information must also be included on where and how the taxon is intended to be used (see Kumschick et al. 2020b Suppl. Material for details). The importer must solicit such a report from a professional scientist [as defined by the Natural Scientific Professions Act, 2003 (Act No. 27 of 2003)], and provide all relevant information regarding the intended use of the taxon that is proposed to be imported. This report is submitted to DFFE as part of an import application.

#### *Step (B.1a) Produce a report*

The report is produced on behalf of an importer by a South African Council for Natural Scientific Professions (SACNASP) registered professional scientist, although it is the responsibility of the importer to engage with DFFE regarding the report.

#### *Step (B.2 & B.2.a) Assess if review of report required & Request a revised report or inform Importer why the current application has been denied*

DFFE is obliged to respond to applications to import a taxon within a set time-frame as specified in the regulations. However, as the requirements for such a report are specified in the regulations, there is a clear basis on which a report may be sent back to the importer without it being sent for further review. If the legislative requirements for such a report are met, the report may be sent both to SANBI for scientific review and to other affected governmental agencies (e.g. relevant provincial officials) for their input. Recommendations from SANBI may also indicate that revisions are required (steps B.3 and B.6 below). In this process all communication with the person who produced the report is via DFFE through the importer.

#### *Step (B.3) Quality control*

SANBI will then conduct an initial quality check of the report similar to that of the other process (cf. A.3). SANBI together with the ASRARP Secretariat will check that an import application is required, specifically that there is evidence that the taxon is alien to the country and that there is no evidence that the taxon is already legally in the country (although there is no set protocol for this at present). Moreover, in the case of a CITES-listed taxon, there will be a check that an appropriate CITES permit was issued. Second, as there is no pro forma for such reports (cf. the RAAT framework), SANBI and the ASRARP Secretariat will check that there is a proper assessment of: a) the likelihood of the taxon concerned escaping from confinement; b) the potential that the taxon becomes invasive should it escape or be released from confinement; and c) the potential harmful impacts should the taxon become invasive.

#### *Step (B.4) Review import report and develop recommendations*

The role of ASRARP in reviewing the request for an import is similar to the other process, with the main exception being that, given time constraints, a request might be discussed over e-mail rather than at a plenary meeting. The review of the technical content by external reviewers is largely as in the other process, however given the potentially commercially sensitive nature of import application, a greater emphasis is placed on ensuring that external reviewers treat all information furnished to them in strict confidence.

ASRARP will arrive at one of the following recommendations:

- no permit is required;
- issue a permit with no conditions;
- issue a permit with conditions;
- issue a permit with conditions, and propose the taxon for consideration for listing under Category 2 pending a risk analysis according to the RAAT framework;
- decline a permit; or
- the importer should be requested to provide further information.

Additionally, if a prohibited list is included in future regulations, it might be appropriate to consider the taxon to be added to such a list.

#### *Step (B.5) Process recommendation*

SANBI will process ASRARP's recommendation and submit it to DFFE. However, unlike the other process, the report will not be submitted to an online repository and placed in the public domain. All communication is via DFFE through the importer (i.e. SANBI will not directly engage with whomever produced the report).

#### *Step (B.6) Interested and affected governmental organisations consulted*

This process of consultation is similar to that of the process for revising the regulatory lists, although with import applications this consultation may be initiated the moment DFFE considers that an import application requires review. Therefore, such consultation might happen in parallel to the scientific review process facilitated by SANBI.

*Step (B.7) Consider import report and other sources of evidence and make a decision*

As in the previous process, the RARC will consider all information and make a decision.

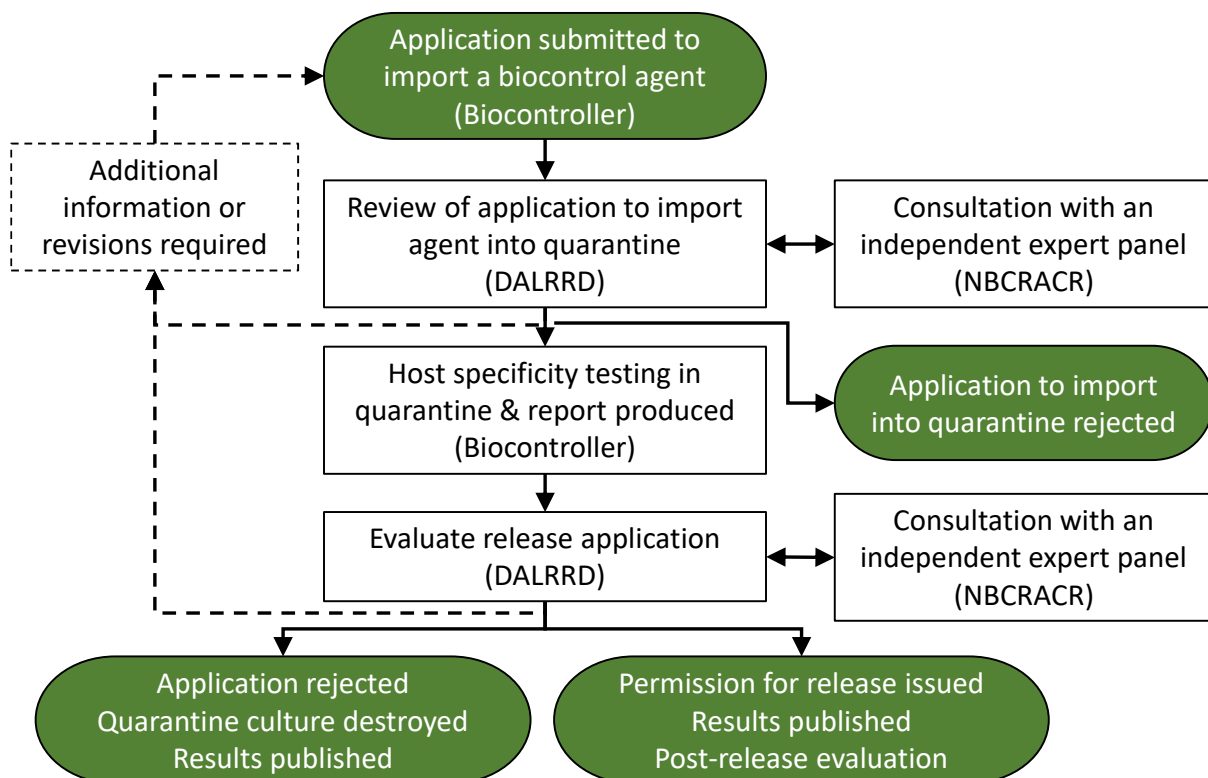
*Step (B.8) Communicate decision to issue an import permit to the Importer*

The decision by the RARC is then sent by DFFE, who issue a permit to the importer .

*Step (B.9) Add to list of alien taxa legally in the country, and potentially follow process A and add to the NEM:BA A&S Lists; or Add to list of alien taxa for which an import application has been refused*

One issue that needs to be resolved is that, unlike the other process where a risk analysis report will be produced to underpin a change in the regulatory status, the import (or refusal of import) of a taxon might explicitly or implicitly precipitate a change in the taxon’s legal status. Importing a taxon with conditions may require a taxon to be listed as category 2 (pending a risk analysis), while importing without conditions or refusing an import creates a precedent that should be available for others to scrutinise in future to avoid wasted effort (e.g. through listing on a prohibited list). It will be important to ensure that any legal change in the status of a taxon due to an import is accompanied by an appropriate risk analysis report. Moreover, while DFFE may issue a permit to import an alien taxon, the importer is not obliged to exercise their rights under such a permit (i.e. to actually import the alien taxon for which a permit is issued). In order to maintain the list of alien taxa legally in the country, it will be important for a record to be kept of when such an import permit is used, and if possible, a physical sample of such an import should be lodged in a recognised collection. If a taxon is to be imported it is recommended that a risk analysis be conducted and evaluated as per process A, and in cases where the taxon is to be listed as category 2, the NEM:BA A&S Lists will need to be revised.

### C. The process for importing a classical biological control agent to South Africa



For details of the steps see Ivey et al. (2021).

**Supplementary material 2: Terms of reference for the Alien Species Risk Analysis Review Panel (ASRARP)**  
version April 2022

## **1 INTRODUCTION AND OBJECTIVES**

### **1.1 Definitions**

Risk analysis is the process of: (1) risk assessment (identifying, evaluating, and measuring the probability and severity of risks), (2) risk management (deciding what to do about risks), and (3) risk communication (disseminating information regarding risks and management options). In the context of the Alien Species Risk Analysis Review Panel (ASRARP), risk assessment is a formal assessment of the hazards posed to the recipient system (South Africa) by the introduction, naturalisation and spread of alien species, including the likelihood of the hazard occurring, and the consequences thereof; risk management is determining how South Africa should respond [specifically whether and how a species should be regulated under the Alien and Invasive Species Regulations, 2014 (updated in 2020), promulgated in terms of National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), (“NEM:BA A&IS Regulations”)]; and risk communication is clearly outlining the scientific evidence of the risks, areas of uncertainty, and management options.

### **1.2 Requirements**

The South African Government has formally committed to ensuring there is a process whereby South Africa analyses the risks due to biological invasions:

- 1.2.1 South Africa is a party to the Convention on Biological Diversity (CBD). During the sixth session of the Conference of Parties (COP 6) to the CBD, Parties adopted guiding principles, and a programme of work for the implementation of Article 8 (h) (decision VI/23. Article 8(h) of the CBD calls on Parties to “as far as possible and appropriate: Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or native species”;
- 1.2.2 South Africa is party to the World Trade Organisation (“WTO”), the International Plant Protection Convention (“IPPC”) and the World Organisation for Animal Health (“OIE”). The WTO, IPPC, and OIE, have similar definitions of risk assessment and analysis (as above), and require parties to conduct risk analyses based on available scientific evidence and in an independent, objective and transparent manner; and
- 1.2.3 Sections 65 (2) and 71 (2) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004; amended 2013), and Chapter 6 of the NEM:BA A&IS Regulations of 2020.

The responsibility for the management of alien and invasive species is shared between National Departments, with most aspects of the implementation of the NEM:BA A&IS Regulations assigned to the Directorate: Biosecurity, under the Department of Forestry, Fisheries, and the Environment (DFFE: Biosecurity). The DFFE mandated the South African National Biodiversity Institute (SANBI) to constitute a scientific advisory panel dealing with issues pertaining to the risks posed by alien species (ASRARP).

### **1.3 Aims**

ASRARP aims:

- 1.3.1 to make informed recommendations on whether to approve applications, and any permit conditions pertaining thereto, to:
  - 1.3.1.1 import alien species;
  - 1.3.1.2 list species under the NEM:BA A&IS Regulations;
  - 1.3.1.3 delist species under the NEM:BA A&IS Regulations; and
  - 1.3.1.4 change the category under which species are listed under the NEM:BA A&IS Regulations;
- 1.3.2 to develop a set of standard conditions under which species listed as category 2 may be granted a permit, and review any recommendations for such conditions;
- 1.3.3 to review risk analyses conducted on currently listed species to ensure that they are appropriately conducted;
- 1.3.4 as necessary, review guidelines aligned to Chapter 6 of the NEMBA A&IS Regulations;
- 1.3.5 to establish realistic timeframes for review of applications in the context of the number of applications received;
- 1.3.6 to identify external expert reviewers who can review documents;
- 1.3.7 to ensure that recommendations consider best available evidence of overall environmental, human health, and socio- economic risks and benefits associated with alien species;

- 1.3.8 to be available to provide recommendations on any proposed changes to the A&IS Lists and Regulations before they are sent to the Minister for approval; and
- 1.3.9 ensure recommendations and the evidence underpinning them are clearly and transparently communicated.

## **2 MEMBERSHIP AND COMPOSITION**

- 2.1 The ASRARP will consist of:
- representatives from the SANBI; and
  - independent panel members that can provide relevant expertise (including taxon specialists, risk analysis scientists, and other experts in relevant disciplines). Panel members will be appointed to the ASRARP by the SANBI.
- 2.2 The structure of the ASRARP is as follows:
- Chair: Independent Panel Member
  - Vice-Chair: Independent Panel Member
  - Secretariat: SANBI officials
  - Independent Panel Members
  - Ex-officio SANBI members
- 2.3 A quorum is formed by the presence of at least one member of the Secretariat, either the Chair or the Vice-Chair, and a third of the independent panel members (including the Chair and Vice-Chair).
- 2.4 Panel members are expected to be appointed for the full period in which a given ASRARP is constituted, with the dates on which one panel ceases and the following one is constituted to align with funding cycles determined by the SANBI-DFFE funding cycles.
- 2.5 Panel members must reapply to serve on ASRARP for each new funding cycle.
- 2.6 In case of resignation or removal from the panel of a member, a new member can be co-opted by the Chair and Vice-Chair with the approval of the Secretariat, for the remainder of the term of the resigned member.
- 2.7 The ASRARP Chair and Vice-Chair will be elected by a vote of the full membership of ASRARP in a process as agreed at a meeting of ASRARP at the start of each funding cycle.
- 2.8 Additional expert advisors and reviewers may be co-opted on an ad hoc needs basis, and for specific risk analyses.
- 2.9 The SANBI will pay the costs of members to attend meetings of the ASRARP including flights, accommodation, and transport.
- 2.10 The SANBI will pay non-public servants a consultation fee (where applicable, for review of documents and hours spent at meetings) for their services to ASRARP. There will be a set rate of pay for reviewing documents within the specified timeframe for ASRARP members, relevant experts, and reviewers negotiated on an annual basis.
- 2.11 Members must declare any conflict of interest with a particular application and, as appropriate, recuse themselves from all ASRARP activities pertaining to the application where a conflict of interest arises (see Annexure 1 for guidelines).
- 2.12 Excluding ex-officio members, panel members are present in their own capacity and whatever organisations they work for or are affiliated to are not recorded.

## **3 PERFORMANCE**

- 3.1 Members commit to achieving the aims of ASRARP, and to spend time to work towards achieving these aims;
- 3.2 Panel members may be removed from the panel should they not be fulfilling their contractual obligations.
- 3.3 Delays in handling documents by more than 21 working days without valid reasons, as determined by the Chair, Vice-Chair, and Secretariat, may lead to a member's removal from the panel;
- 3.4 Missing two consecutive ASRARP meetings without valid reasons, as determined by the Chair, Vice-Chair and Secretariat, may lead to a member's removal from the panel.

## **4 MEETINGS**

- 4.1 The ASRARP shall meet at least three times a year and consult electronically on a needs basis.
- 4.2 Meeting dates and venues will be determined by the Chair in consultation with the Members of the ASRARP.

- 4.3 Documentation for meetings will be circulated at least one week prior to each meeting.
- 4.4 Minutes will be drafted for each meeting and circulated to all members within a week of the meeting for comment.
- 4.5 Revised minutes will be discussed at the following meeting and should be thereafter approved as an official record of the meeting at which they were taken.
- 4.6 The ASRARP Secretariat will keep records of attendance, the agenda, and minutes of each meeting.

## **5 PROCEDURE FOR DEVELOPING RECOMMENDATIONS**

- 5.1 In the case of applications for import or for changes to listings, ASRARP is to provide a recommendation based on the best available scientific evidence and the report from reviewers (as appropriate) as to whether an application should be accepted or rejected.
- 5.2 ASRARP need to verify that appropriate stakeholders were identified, whether conflicts of interest might exist, and how they were addressed in the risk analysis.
- 5.3 In instances where ASRARP recommends rejecting an application, the reasons for the rejection need to be clearly stated and the conditions under which an application could be reconsidered outlined.
- 5.4 If ASRARP does not reach consensus, or the recommendation from ASRARP is different from that from the expert reviewers, the final recommendation should reflect the discussion held and note differences in opinion.
- 5.5 A risk analysis report in support of a listing or a change in listing can be rejected by ASRARP if it has been reviewed, tabled at two meetings, and the assessor's response to the review was deemed unsatisfactory.
- 5.6 The recommendations of ASRARP are to be communicated to the SANBI.
- 5.7 It is intended that all ASRARP recommendations are tabled at meetings of ASRARP with a view to reaching consensus prior to their submission to the SANBI.
- 5.8 An application of a specific and urgent nature can be discussed by the Chair and relevant risk assessors over the telephone prior to submission of recommendations to the SANBI. This consultation does not replace the requirement for consultation with the whole panel over e-mail.

## **6 CONFIDENTIALITY**

- 6.1 The ASRARP shall treat information furnished by the DFFE, the SANBI, the applicant or any other person for purposes of the execution of duties under these Terms of Reference, as confidential.
- 6.2 Subject to clause 5.1, an ASRARP member so furnished with information shall not disclose such information to another person without the prior written consent of the Chair and shall take reasonable steps to ensure that such information is not disclosed to another person.
- 6.3 ASRARP members agree that clause 5.1 is not intended to restrict use or disclosure of any portion of such information which:
  - 6.3.1 is made known to the public; and/or;
  - 6.3.2 is rightfully received and having no obligation of confidentiality to DFFE.
- 6.4 Notwithstanding 5.1–5.3, an ASRARP member may contact external expert reviewers to consult regarding technical issues providing it does not compromise the rights of the applicant.
- 6.5 External expert reviewers consulted by an ASRARP member are required to agree in writing to adhere to these terms of reference, and specifically the clause on confidentiality, prior to receiving confidential information.
- 6.6 The provisions of this clause will survive the termination of membership.
- 6.7 Notes from ASRARP meetings will record relevant discussion leading to recommendations but will not attribute these to a particular panel member.

## **7 LIABILITY**

ASRARP members will not be held liable for damages caused as a result of a decision taken by the Minister based on a recommendation by ASRARP provided members of ASRARP can show that they did not act fraudulently or in bad faith.

## **8 PROVISION FOR REVISION OR AMENDMENT**

- 8.1 These Terms of Reference will be reviewed at the end of each term of ASRARP.
- 8.2 These Terms of Reference can be revised and amended when necessary and as agreed to by consensus of the ASRARP at any other point.

## Annexure 1: Guidelines for declaring conflicts of interest

ASRARP members or reviewers working on behalf of ASRARP must notify the ASRARP Chair, and recuse themselves from pertinent items tabled to ASRARP if any of the following apply:

- they are party to an application;
- they are party to the production of a document that is sent to ASRARP for review;
- they have a close personal relationship with the applicant or the risk assessor; and
- any decision taken will likely have a direct financial impact on them.

ASRARP members or reviewers working on behalf of ASRARP must notify the ASRARP Chair, and may be recused from an item tabled at ASRARP if:

- there is any reasonable expectation that they may benefit in the future from the issuing of a permit; or
- they were contacted by either the applicant or risk assessor with an aim to soliciting their input.

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