Generic Impact Scoring System GISS

Excel version of 27.04.2016

Supplementary Material

Nentwig W, Bacher S, Pyšek P, Vilà M, Kumschick S (2016) The Generic Impact Scoring System (GISS): a standardized tool to quantify the impacts of alien species. Environmental Monitoring and Assessment, DOI: 10.1007/s10661-016-5321-4

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Taxonomic groups	Main ecosystems	Pathways
Vertebrate	Terrestrial	Release
Invertebrate		Escape
Protozoa	Freshwater	Contaminant with specific commodity
Plant		Stowaway with transport vector
Fungus	Marine	Corridor
Bacteria		Others
		Unknown

BLUE fields are those where some input is expected from you.

Introduced as	Impact levels	Confidence level
Ornamental	0	1
Crop plant (including fuel, fibre, stain)	1	2
Pet	2	3
Hunting/fishing	3	
Biocontrol	4	
Others	5	
Unknown		

A Species description

Species name		Genus, species, authority
Higher taxonomy		Family and 1-2 further higher taxa
Taxonomic comment		If appropriate, add relevant synonyms. Mention if this is a cryptic species
Taxonomic group		**Drop down menu**
Main ecosystem		**Drop down menu**
Area of origin		Usually a continent, river system, ocean, or major biogeographic area. Has to be different from the invaded area, otherwise the species is not alien.
Invaded area		Has to be different from the area of origin, otherwise the species is not alien. You may list invaded areas within Europe and also outside of Europe.
Area assessed		GISS can be applied to all areas, but the area assessed has to be different from the area of origin.
Pathway		**Drop down menu**
Introduction time		Year or whatever is known
Used as		**Drop down menu**
Comments		If appropriate, add comments.

B Impact assessment

1 Environmental impacts

1.1 Impacts on plants or vegetation (through mechanisms other than competition, see below)

List of potential impacts

Impacts can cause changes in reproduction, survival, growth, and abundance of plants in the invaded community. In case of alien plants, their impacts may consist of allelopathy or the release of plant exudates such as oxygen or salt. In case of alien animals, their impacts include herbivory, grazing, bark stripping, antler rubbing, feeding on algae, or uprooting of aquatic macrophytes. The impacts in this category result in restrictions in establishment, pollination, or seed dispersal of native species. The impacts range from population decline to population loss and also include minor changes in the food web. These impacts concern direct species interactions whereas impacts at the ecosystem level are covered by category 1.6. These impacts concern natural and semi-natural environments whereas agricultural and forestry ecosystems are dealt with in category 2.1.

Impact description

Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.

Impact level

0	No data available, no impacts known, not detectable or not applicable.
1	Minor impacts, only locally or on abundant species.
2	Minor impacts, not only locally or on abundant species.
3	Medium impacts, large-scale, several species concerned, relevant decline (this includes decrease in species richness or diversity).
4	Major small-scale destruction of the vegetation, decrease of species of concern.
5	Major large-scale destruction of the vegetation, threat to species of concern, including local extinctions.

Your conclusion **Drop down menu**

Confidence level

What is the overall confidence level of your conclusion with this question?

low = 1 medium=2 high=3

Your conclusion **Drop down menu**

1.2 Impacts on animals through predation, parasitism, or intoxication

List of potential impacts

Impacts may concern single animal species or a guild, e.g. through predation, parasitism, or intoxication, measurable for example as reductions in reproduction, survival, growth, or abundance. When the alien species is a plant, the impact can be due to changes in food availability or palatability (e.g. fruits, forage or flowers affecting pollinators), and the uptake of secondary plant compounds or toxic compounds by animals. These impacts might act on different levels, ranging from population decline to population loss and they include also minor changes in the food web. These impacts concern direct species interactions whereas impacts on ecosystem level are covered by category 1.6. These impacts concern only free-living animals in the wild whereas animal production is covered by category 2.2.

Impact description

Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.

Impact level

0	No data available, no impacts known, not detectable or not applicable.
1	Minor impacts, only locally or on abundant species.
2	Minor impacts, not only locally or on abundant species.
3	Medium impacts, large-scale, several species concerned, relevant decline (this includes decrease in species richness or diversity).
4	Major small-scale impacts on target species, decrease of species of concern.
5	Major large-scale impacts on target species, threat to species of concern, including local extinctions.

Your conclusion **Drop down menu**

Confidence level

What is the overall confidence level of your conclusion with this question?
low = 1 medium=2 high=3

Your conclusion **Drop down menu**

1.3 Impacts on other species through competition

List of potential impacts

Impacts concern at least one native species, e.g. by competition for nutrients, food, water, space or other resources, including competition for pollinators which might affect plant fecundity (i.e. fruit or seed set). Often, the alien species outcompetes native species due to higher reproduction, resistance, longevity or other mechanisms. In the beginning, these impacts might be inconspicuous and only recognizable as slow change in species abundance but might lead to the local/global disappearance of a native species. It includes behavioural changes in outcompeted species and ranges from population decline to population loss.

Impact description

Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.

Impact level

0	No data available, no impacts known, not detectable or not applicable.
1	Minor impacts, only locally or on abundant species.
2	Minor impacts, not only locally or on abundant species.
3	Medium impacts, large-scale, several species concerned, relevant decline, including decrease in species richness or diversity.
4	Major small-scale impacts on target species, decrease of species of concern.
5	Major large-scale impacts on target species, threat to species of concern, including local extinctions.

Your conclusion **Drop down menu**

Confidence level

What is the overall confidence level of your conclusion with this question?
low = 1 medium=2 high=3

Your conclusion **Drop down menu**

1.4 Impacts through transmission of diseases or parasites to native species

List of potential impacts

Host or alternate host for native or alien diseases (viruses, fungi, protozoans or other pathogens) or parasites, impacts by transmission of diseases or parasites to native species.

Impact description

Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.

Impact level

0	No data available, no impacts known, not detectable or not applicable.
1	Occasional transmission to native species. No impacts on native species detectable.
2	Occasional transmission to native species. Only minor impacts on native species detectable.
3	Regular transmission to native species. Minor population decline in native species.
4	Transmission to native species and/or species of concern, decline of these species but no extinction.
5	Transmission to native species and/or species of concern, serious decline of these species and/or local extinction.

Your conclusion **Drop down menu**

Confidence level

What is the overall confidence level of your conclusion with this question?
low = 1 medium=2 high=3

Your conclusion **Drop down menu**

1.5 Impacts through hybridization

List of potential impacts

Impacts are through hybridization with native species, usually closely related to the alien taxon, leading to a reduced or lost opportunity for reproduction, sterile or fertile hybrid offspring, gradual loss of the genetic identity of a species, and/or disappearance of a native species, i.e. extinction.

Impact description

Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.

Impact level

0	No data available, no impacts known, not detectable or not applicable.
1	Hybridization possible in ornamental breeding or captivity, but not or only rarely in the wild.
2	Hybridization common in the wild, no hybrid offspring, constraints to normal reproduction.
3	Hybridization common, with sterile offspring.
4	Hybridization common with fertile offspring, growing hybrid populations.
5	Hybridization common with fertile offspring, predominant hybrid populations, increasing loss of the genetic identity of a native species, local extinction of the native species.

Your conclusion — Drop down menu

Confidence level

What is the overall confidence level of your conclusion with this question?
low = 1 medium=2 high=3

Your conclusion: 2 — Drop down menu

1.6 Impacts on ecosystems

List of potential impacts

Impacts on characteristics of an ecosystem, its nutritional status (e.g. changes in nutrient pools and fluxes, which may be caused by nitrogen-fixating symbionts, increased water turbidity or faecal droppings), modification of soil or water body properties (e.g. soil moisture, pH, C/N ratio, salinity, eutrophication), and disturbance regimes (vegetation flammability, changes in hydrology, erosion or soil compacting), changes in ecosystem functions (e.g. pollination or decomposition rates), or other physical or structural changes. Impacts on ecosystems also include modification of successional processes. Such modifications may lead to reduced suitability (e.g. shelter) for native species, thus causing their disappearance. The application of pesticides to control impacts might have side effects on non-target organisms which count as ecosystem impacts here.

Impact description

Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.

Impact level

0	No data available, no impacts known, not detectable or not applicable.
1	Minor impacts, only locally.
2	Minor impacts, not only locally, e.g., impact on a particular ecosystem parameter.
3	Medium impacts, large-scale, damage of sites of conservation importance, relevant ecosystem modifications, impact on several ecosystem properties, pesticide applications needed, relevant changes in species composition.
4	Major small-scale effects, damage of sites of conservation importance, major changes in ecosystem services, decrease of species of concern.
5	Major large-scale effects, damage of sites of conservation importance, changes in disturbance regimes, threat to species of concern, including local extinctions.

Your conclusion — Drop down menu

Confidence level

What is the overall confidence level of your conclusion with this question?
low = 1 medium=2 high=3

Your conclusion — Drop down menu

2 Economic impacts

2.1 Impacts on agricultural production

List of potential impacts

Impacts through damage to crops, pastures or plantations, but also to horticultural and stored products. Impacts include competition with crops by weeds, direct feeding damage (from feeding traces which reduce marketability to complete production loss) but also reduced accessibility, usability or marketability through contamination and cosmetic changes. Impacts include the need for applying pesticides which involve additional costs, also by reducing market quality. Impacts usually lead to an economic loss.

Impact description

Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.

Impact level

0	No data available, no impacts known, not detectable or not applicable.
1	Minor impacts, only locally, negligible economic loss.
2	Minor impacts, but more wide-spread, minor economic loss.
3	Medium impacts, large-scale or frequently, pesticide application necessary, medium economic loss.
4	Major impacts with high damage, often occurring or with high probability, major economic loss.
5	Major impacts with complete destruction and economic loss.

Your conclusion — Drop down menu

Confidence level

What is the overall confidence level of your conclusion with this question?
low = 1 medium=2 high=3

Your conclusion — Drop down menu

2.2 Impacts on animal production

List of potential impacts

Impacts through competition with livestock, transmission of diseases or parasites to livestock and predation of livestock, or, more generally, affecting livestock health. Intoxication of livestock through changes in food palatability, secondary plant compounds or toxins, weakening or injuring livestock, e.g., by stinging or biting. Also impacts on livestock environment such as pollution by droppings on farmland which domestic stock are then reluctant to graze. It also includes reduction of livestock accessibility to grazing land. Hybridization with livestock. Impacts include the need for applying pesticides which involve additional costs, also by reducing market quality. Impacts usually lead to an economic loss. This category refers to livestock, poultry, game animals, fisheries and aquaculture.

Impact description

Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.

Impact level

0	No data available, no impacts known, not detectable or not applicable.
1	Minor impacts, only locally, negligible economic loss.
2	Minor impacts, but more wide-spread, minor economic loss.
3	Medium impacts, large-scale or frequently, pesticide application necessary, medium economic loss.
4	Major impacts with high damage, often occurring or with high probability, major economic loss.
5	Major impacts with complete destruction and economic loss.

Your conclusion **Drop down menu**

Confidence level

What is the overall confidence level of your conclusion with this question?
low = 1 medium=2 high=3

Your conclusion **Drop down menu**

2.3 Impacts on forestry production

List of potential impacts

Impacts on forests or forest products through plant competition, parasitism, diseases, herbivory, effects on tree or forest growth and on seed dispersal. Impacts might affect forest regeneration through browsing on young trees, bark gnawing or stripping and antler rubbing. Damage includes felling trees, defoliating them for nesting material or causing floods. Impacts include the need for applying pesticides which involve additional costs, also by reducing market quality. Impacts usually lead to an economic loss.

Impact description

Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.

Impact level

0	No data available, no impacts known, not detectable or not applicable.
1	Minor impacts, only locally, negligible economic loss.
2	Minor impacts, but more wide-spread, minor economic loss.
3	Medium impacts, effects on forest regeneration, large-scale or frequently, pesticide application necessary, medium economic loss.
4	Major impacts with high damage, often occurring or with high probability, major economic loss.
5	Major impacts with complete destruction and economic loss.

Your conclusion **Drop down menu**

Confidence level

What is the overall confidence level of your conclusion with this question?
low = 1 medium=2 high=3

Your conclusion **Drop down menu**

2.4 Impacts on human infrastructure and administration

List of potential impacts

Impacts include damage to human infrastructure, such as roads and other traffic infrastructure, buildings, dams, docks, fences, electricity cables (e.g., by gnawing or nesting on them) or through pollution (e.g. by droppings). Impacts through root growth, plant cover in open water bodies or digging activities on watersides, roadside embankments and buildings may affect flood defence systems, traffic infrastructure or stability of buildings. Impacts include the need for applying pesticides and performing management and eradication programmes, their development and further administration costs, as well as costs for research and control. Impacts usually lead to an economic loss.

Impact description

Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.

Impact level

0	No data available, no impacts known, not detectable or not applicable.
1	Minor impacts, only locally, negligible economic loss.

2	Minor impacts, but more wide-spread, minor economic loss.
3	Medium impacts, large-scale or frequently, pesticide application necessary, medium economic loss.
4	Major impacts with high damage, often occurring or with high probability, major economic loss.
5	Major impacts with complete destruction and economic loss.

Your conclusion **Drop down menu**

Confidence level

What is the overall confidence level of your conclusion with this question?

low = 1 medium=2 high=3

Your conclusion **Drop down menu**

2.5 Impacts on human health

List of potential impacts

Impacts comprise injuries (e.g. bites, stings, scratches, rashes, accidents), transmission of diseases and parasites to humans, bioaccumulation of noxious substances, health hazard due to contamination with pathogens or parasites (e.g. through contaminated water, soil, food, or by feces or droppings). It also includes human hazards to the ingestion or contact to plant secondary compounds which are toxic or poisonous, or to allergenic substances such as pollen. Impacts might affect human safety and cause traffic accidents. Impacts include the need for applying pesticides which due to their low selectivity and/or residues might have side-effects on humans. Via health costs, impacts usually lead to economic costs due to medication and treatments costs, as well as the consequences in productive losses from these impacts on workforce.

Impact description

Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.

Impact level

0	No data available, no impacts known, not detectable or not applicable.
1	Minor impacts, only locally, negligible economic costs.
2	Minor impacts, but more wide-spread, minor economic costs.
3	Medium impacts, large-scale or frequently, pesticide application necessary, medium economic costs.
4	Major impacts with high damage, often occurring or with high probability, but rarely fatal, major economic costs.
5	Major impacts, fatal issues, high economic costs.

Your conclusion **Drop down menu**

Confidence level

What is the overall confidence level of your conclusion with this question?

low = 1 medium=2 high=3

Your conclusion **Drop down menu**

2.6 Impacts on human social life

List of potential impacts

Noise disturbance, pollution of recreational areas (water bodies, rural parks, golf courses or city parks), fouling, eutrophication, damage by trampling and overgrazing, restrictions in accessibility (e.g. by thorns, other injuring structures, successional processes, or recent pesticide application) to habitats or landscapes of recreational value. Impact on human wellbeing. Restrictions or loss of recreational activities, aesthetic attraction, touristic value, or employment possibilities. Restrictions concern also aesthetic values and natural or cultural heritage.

Impact description

Describe impact in a few lines. If native species of special concern, e.g., red listed and endemic species, are affected, list their names and include citations.

Impact level

0	No data available, no impacts known, not detectable or not applicable.
1	Minor impacts, only locally, negligible economic loss.
2	Minor impacts, but more wide-spread, minor economic loss.
3	Medium impacts, large-scale or frequently, pesticide application necessary, medium economic loss.
4	Major impacts with high damage, often occurring or with high probability, recreational value of a location strongly affected, major economic loss.
5	Major impacts with complete destruction and loss of recreational value, major economic loss.

Your conclusion **Drop down menu**

Confidence level

What is the overall confidence level of your conclusion with this question?

low = 1 medium=2 high=3

Your conclusion **Drop down menu**

C Conclusions

1 Impact weight

Prior to scoring, it has to be decided if all impact categories are of equal value.
If deviations from default value = 1 are desired, this can be done here.
Provide here a justification of weights different from 1.

Impact category	weight	initial scores		final scores	confidenc
2.1.1 On plants or vegetatio	1		Incomplete	0	0
2.1.2 On animals	1		Incomplete	0	0
2.1.3 Competition	1		Incomplete	0	0
2.1.4 Disease transmission	1		Incomplete	0	0
2.1.5 Hybridization	1		Incomplete	0	2
2.1.6 Ecosystems	1		Incomplete	0	0
2.2.1 Agricultural productio[1]	1		Incomplete	0	0
1.1.2 Animal production	1		Incomplete	0	0
2.2.3 Forestry production[2]	1		Incomplete	0	0
2.2.4 Human infrastructure	1		Incomplete	0	0
2.2.5 Human health	1		Incomplete	0	0
2.2.6 Human social life	1		Incomplete	0	0

2 Overall conclusion

Impact on environment	
Initial scores	0
final scores	0
confidence	0.33
Impact on economy	
Initial scores	0
final scores	0
confidence	0
Total impact	
Initial scores	0
final scores	0
confidence	0.17

Describe your overall conclusion in a few lines. Mention categories where 5 impact points are reached.

3 Assessors and reviewers

It is recommended that the assessments undergo a review process in order to check for completeness and accuracy (i.e. consistency of the assessment). It is also recommended that a small group of assessors discuss their scores to achieve a consensus opinion. Alternatively, the scores of each assessor are documented individually and a mean score is calculated. In this case, statistics on the inter-reviewer agreement such as Cohen's Kappa coefficient are recommended.

Assessor	
Location	
e-mail	
Date	

Reviewer	
Location	
e-mail	
Date	

4 References

Add references to the citations you made in this assessment.

Reference 1	
Reference 2	
Reference 3	

Reference 4	
Reference 5	
Reference 6	
Reference 7	
Reference 8	
Reference 9	
Reference 10	
Reference 11	
Reference 12	
Reference 13	

[1]
FOR MARINE SPECIES: Agricultural production (2.2.1) and Forestry production (2.2.3), as defined in GISS, are irrelevant for marine species. Hence, their weights should be 0 and the rest of the weights 1.2 so that the total sum remains the same (12) and the results are comparable with those for other environments (terrestrial, freshwater).
[2]
FOR MARINE SPECIES: Agricultural production (2.2.1) and Forestry production (2.2.3), as defined in GISS, are irrelevant for marine species. Hence, their weights should be 0 and the rest of the weights 1.2 so that the total sum remains the same (12) and the results are comparable with those for other environments (terrestrial, freshwater).