Puerto Rico and U.S. Virgin Islands horizon scans for the next invasive species

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What is a Horizon Scan?

- “A systematic examination of potential threats and opportunities…and likely future developments, which are at the margin of current thinking and planning”

-Roy et al. 2019 Global Change Biology

- What nonnative species could enter the jurisdiction in the future?
- What nonnative species could survive, reproduce, and establish population in a jurisdiction?
- What nonnative species pose a risk of harm to the jurisdiction?

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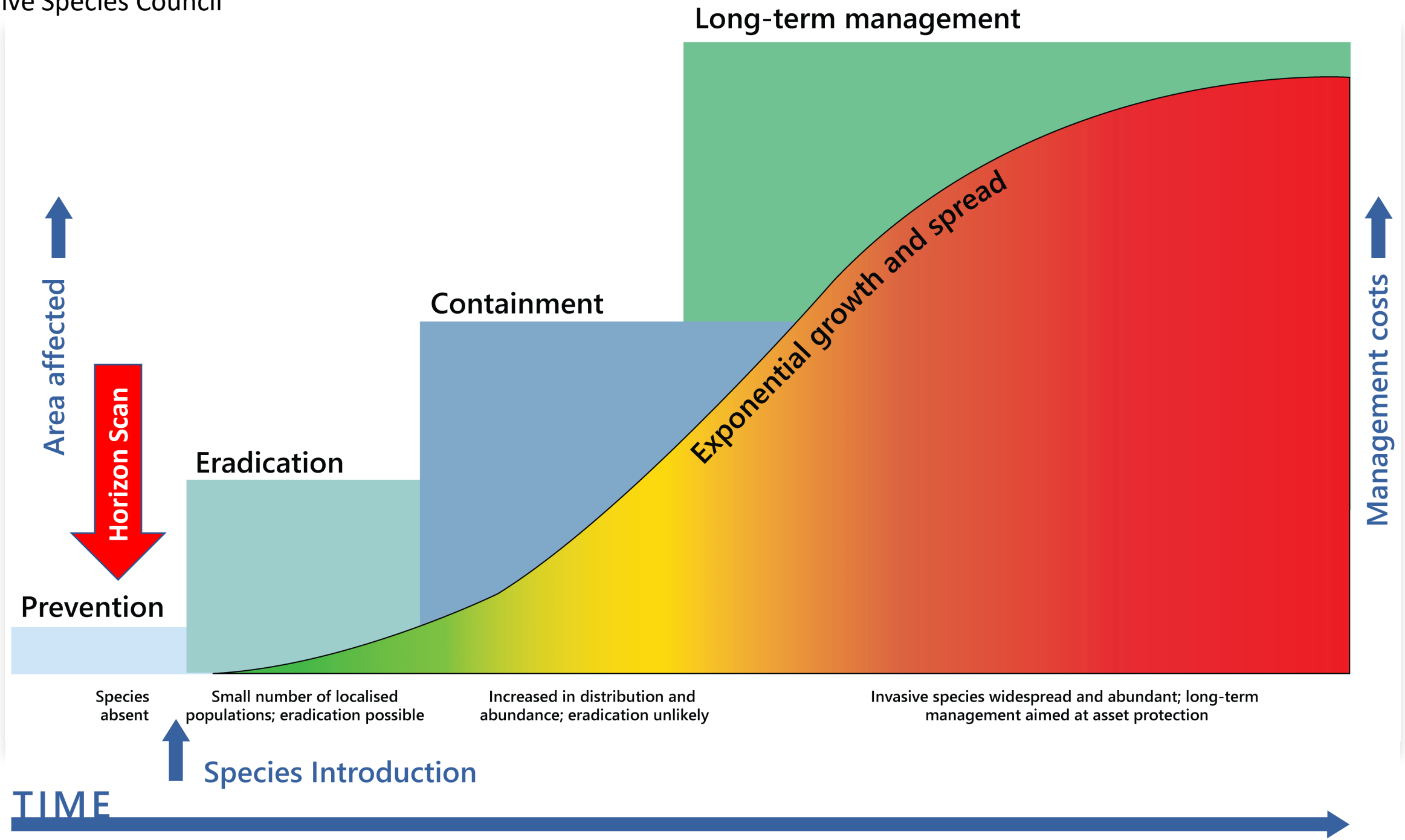
Invasive Species Council



Foci of Horizon Scan

Develop	Develop an approach to review a large number (thousands) species
Identify	Identify species that that have a high risk of invasiveness at a jurisdiction.
Evaluate	Evaluate species with unknown natural histories based on phylogenetic and expert knowledge (the unknowns)
Create	Create a repeatable tool for early detection and rapid response efforts (EDRR).
Complement	Be complementary to other horizon-scanning projects being conducted on a national, regional and State / Territorial / Tribal level.

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Foci of Horizon Scan

Experts — Use territorial knowledge and experts as much as possible

Species — All taxa project (terrestrial, aquatic, and marine)

Evaluate — Assess Puerto Rico and U.S. Virgin Islands separately

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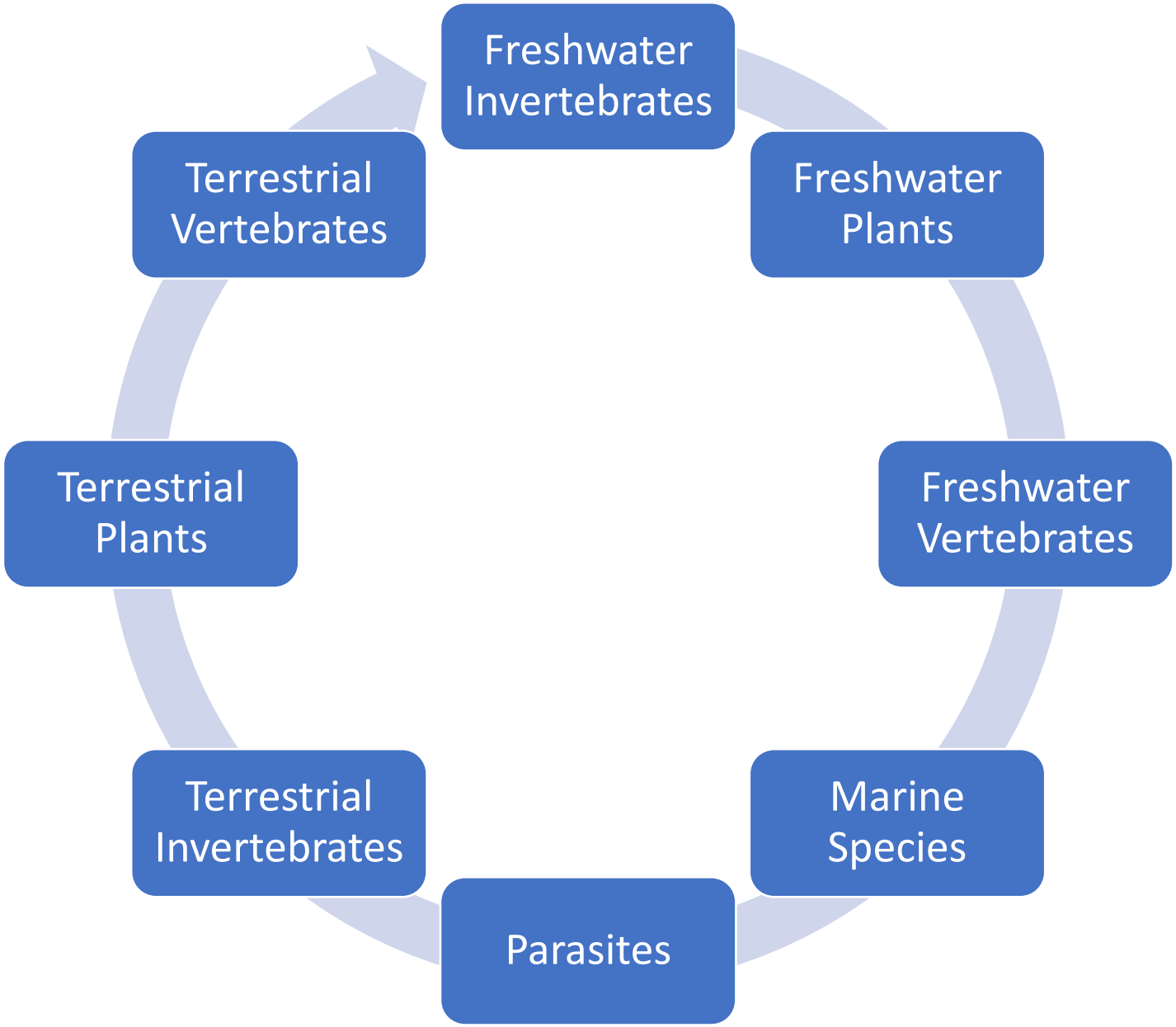
Freshwater Invertebrates
Freshwater Plants
Freshwater Vertebrates
Marine Species
Parasites
Terrestrial Invertebrates
Terrestrial Plants
Terrestrial Vertebrates

Global Horizon Scan

List building

- Importation data
- Online sales/ Industry lists
- Known invasives and hitchhikers worldwide

List refinement

- Climate match
- Taxonomic checks
- Expert consultation

Horizon scan assessment

- Risk of arrival
- Risk of establish & spread
- Risk of negative impacts

Final product

- Watchlists of high-risk species

Built on Roy et al. 2014
(Horizon scanning for invasive alien species)

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List Building

Organisms in trade

- Importation records
- Online sales
- Industry lists

Hitchhikers

- Professional Literature
- Country of origin of commerce

Natural migration

- Professional judgment
- Invasive species information systems

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Sources of species data

1. Importation database- USFWS Law Enforcement Management Information System (LEMIS)
2. Global species databases- Global Biodiversity Information Facility GBIF, CABI
3. E-commerce- Web scrape of pet, feeder, live animal trade websites
4. Scientific literature- Published manuscripts looking for known hitch hikers and invasive species

www.cabi.org

www.gbif.org

www.fws.gov/program/office-of-law-enforcement/information-importers-exporters

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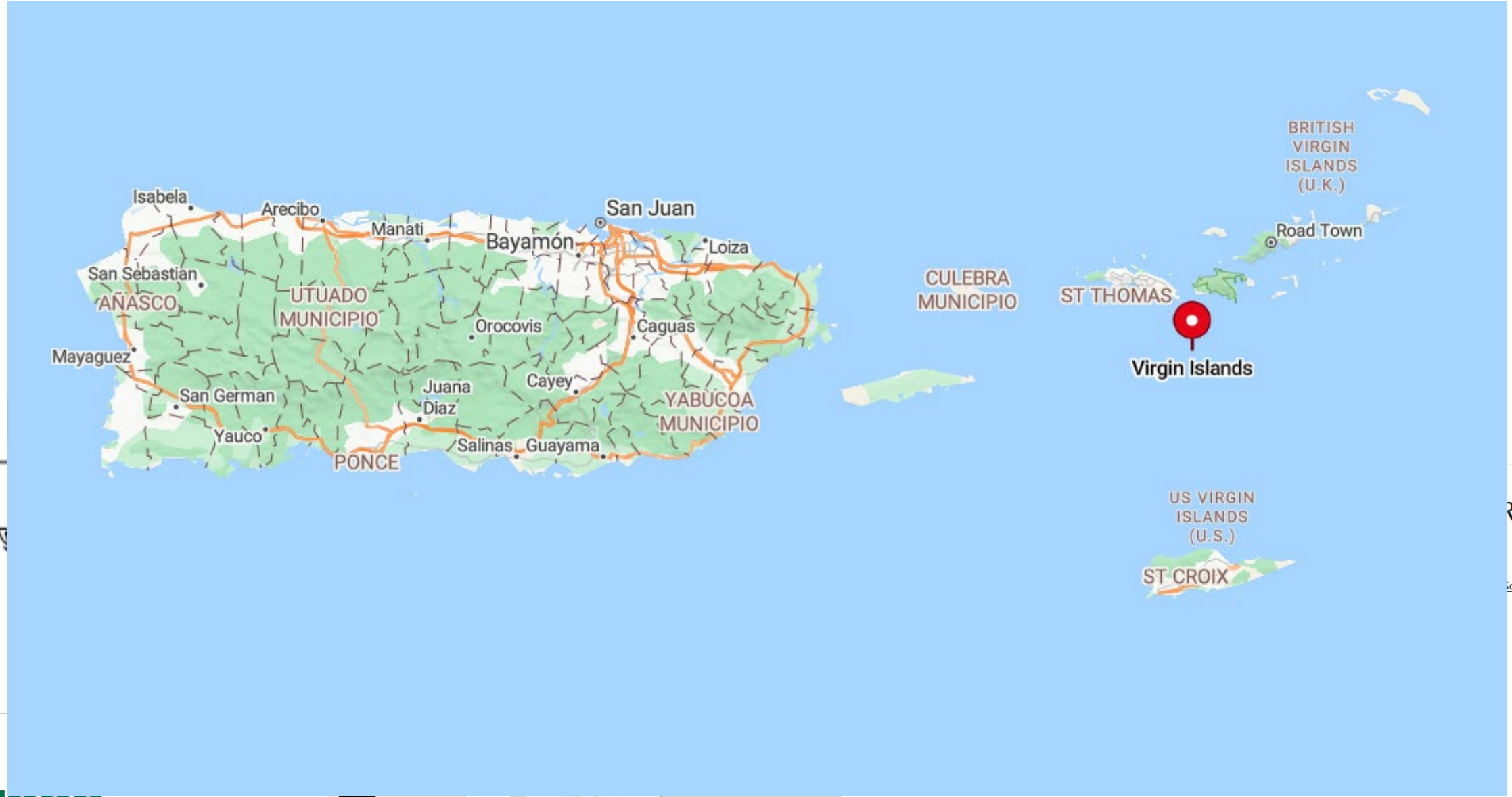

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Scan Overview

- Using a rapid risk screening tool (enhanced from Roy et al., 2014)
- Separately score each taxon within your taxa group for its likelihood of:

Risk of arrival X **Risk of establish & spread** X **Risk of negative impacts**

From 1 = very low to 5 = very high

maximum score of 125

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Roy, Helen E., et al. "Horizon scanning for invasive alien species with the potential to threaten biodiversity in Great Britain." Global change biology 20.12 (2014): 3859-3871.

Scan Overview

- The scoring criteria provided for each risk element may not represent every taxon's situation, the assessor always has the option to deviate from the rubric and put a taxon into any score group based on their discretion.
- A justification should be provided in such situations.

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Risk element 3: Impacts

1	Very low concern: A taxon is unlikely to cause negative impacts on the native biota or abiotic environment, human well-being, or economic systems.
2	Low concern: A taxon is likely to cause (a) declines in the performance (e.g., biomass, body size) of native biota, but no decline in native population sizes or (b) income loss, minor health problems, higher effort or expense to participate in activities, increased difficulty in accessing goods, or minor disruption of social activities, but no significant impact on participation in normal activities. The taxon has no other impacts that would cause it to be classified in a higher impact category.
3	Medium concern: A taxon is likely to cause (a) declines in the population size(s) of native species, but no changes to the structure of communities or to the abiotic or biotic composition of ecosystems or (b) changes in the size of social activities, with fewer people participating, but the activity is still carried out. These changes to social activities could be linked to accessibility to the activity area or mild effects to human health (e.g. allergies). The taxon has no impacts that would cause it to be classified in a higher impact category.
4	High concern: A taxon is likely to cause (a) the local or population extinction of at least one native species, leading to reversible changes[1] in the structure of communities, the abiotic or biotic composition of ecosystems (b) the local[2] disappearance of a social or economic activity from all or part of the area invaded by the alien taxon, collapse of the specific activity, switch to other activities, abandonment of activity without replacement, emigration from region, or moderate effects to human health including any venomous taxon. The taxon has no impacts that would cause it to be classified in a higher impact category.
5	Very high concern: A taxon is likely to cause (a) the replacement and local extinction of native species and will produce irreversible[3] changes in the structure of communities and the abiotic or biotic composition of ecosystems or (b) local disappearance of a social or economic activity from all or part of the area invaded by the alien taxon or major effects to human health, including any venomous taxon.

Risk element 3: Impacts

- Impacts are scored based on effects in three categories: biodiversity and ecosystems (e.g. species, habitats, ecosystems, and ecosystem functioning), economics, and human health.
- In cases where a species could cause multiple impacts, report the impact score for the maximum (worst possible) impact and indicate the category of this impact in the justification section while also briefly indicating other potential impacts.
- Score the impacts to reflect both the severity of the impact and the likelihood the impact would affect the U.S.
- The impact scoring system was modified from EICAT and SEICAT(Blackburn *et al.* 2014; Hawkins *et al.* 2015, Bacher *et al.* 2017)

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Justification and references

- Please provide a concise summary of the evidence used to reach your score and certainty. For example, if you are assessing the impact of a species, you would explain why you reached the score for the maximum impact and would also explain your uncertainty based on the strength of the evidence and the likelihood this impact would happen. Provide the most relevant citations for each score justification.
- Suggested resources are provided in the guidelines document

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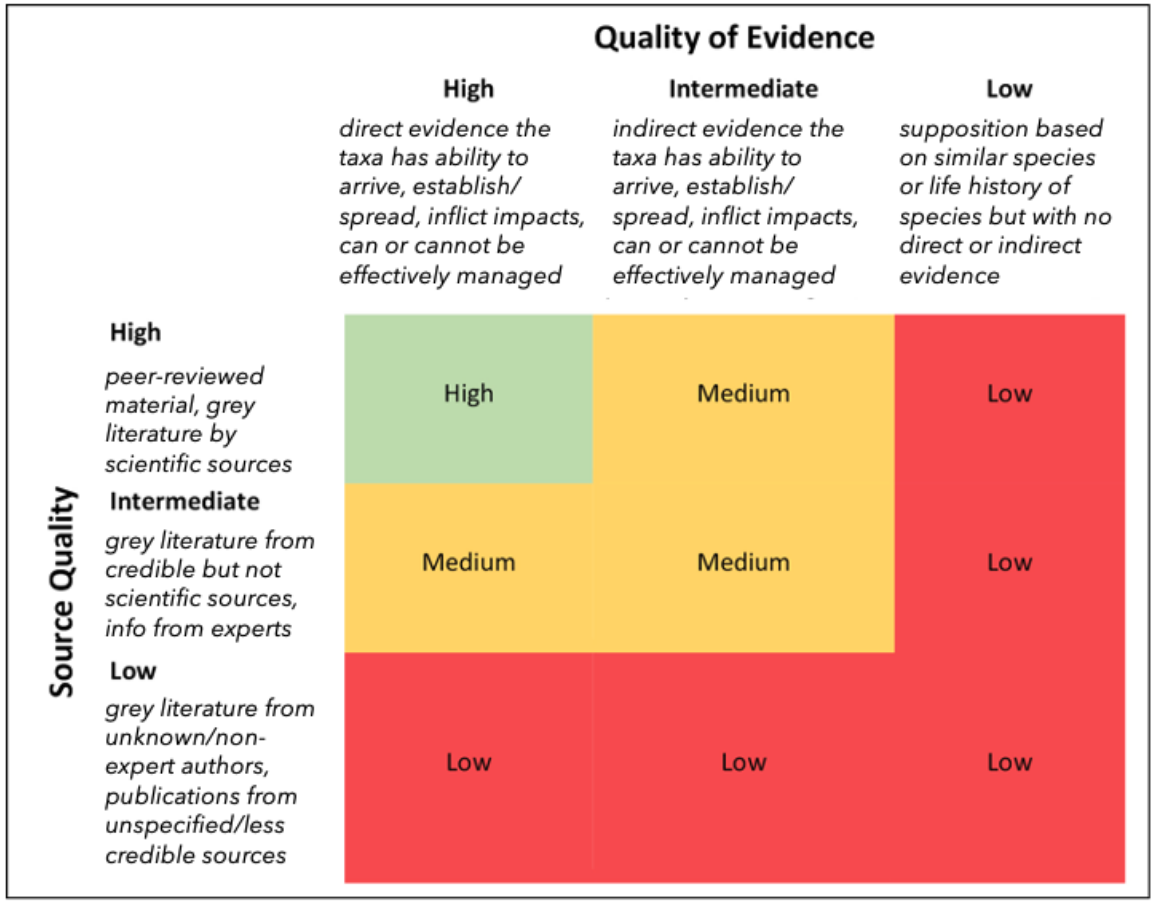
Confidence

- Assign an estimate of the confidence for each likelihood score and an overall confidence estimate for the final score (high, moderate, low, very low).
- Your confidence rating expresses the degree of certainty that you have for the score assigned.



Modified from Peral et al., 2020

Timeline

Scoring ends January 20th

Final consensus workshop in February

Final watch list will be ready in April

Argentine Black and White Tegu (*Salvator merianae*)

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Questions and Discussion

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