

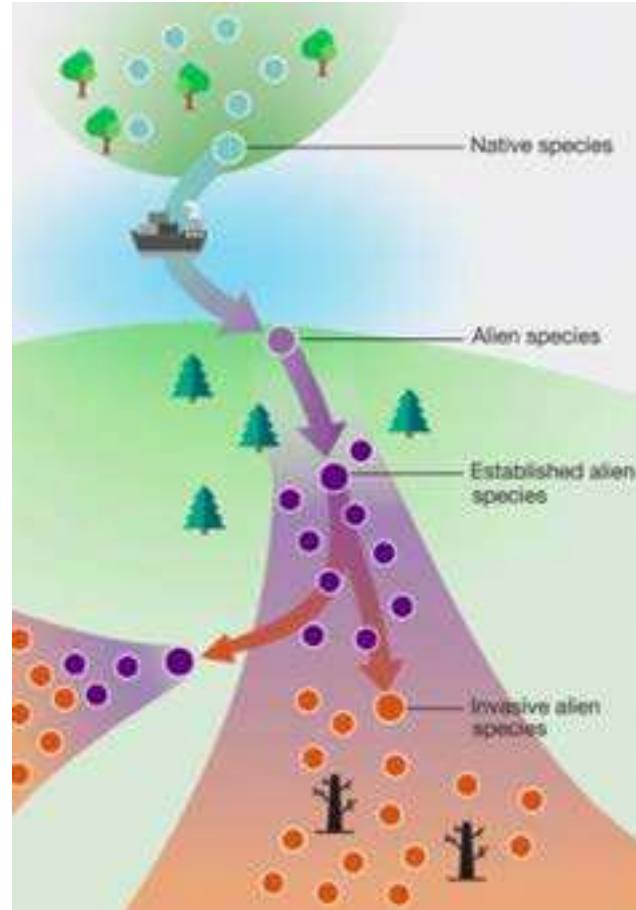
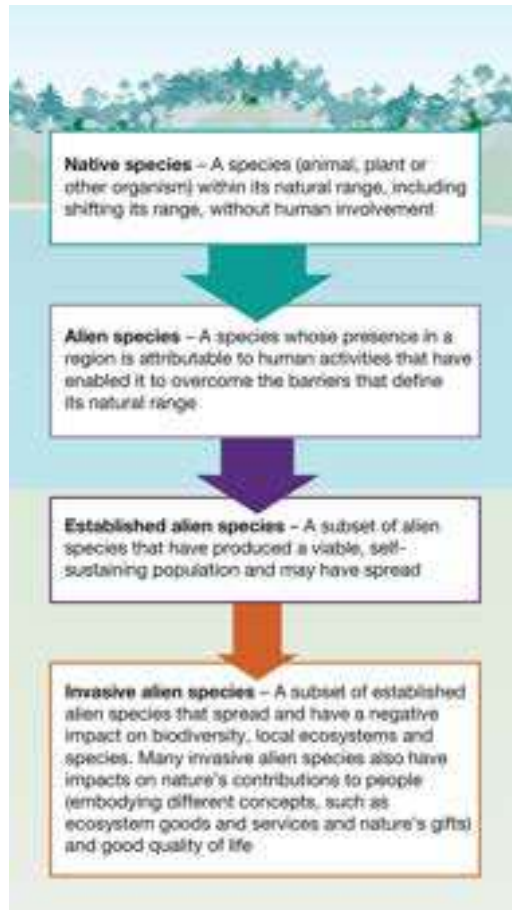
# **Invasive alien plant species: ecologic, economic and social threat in the Barents region**

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# What is an invasive alien species (IAS)?

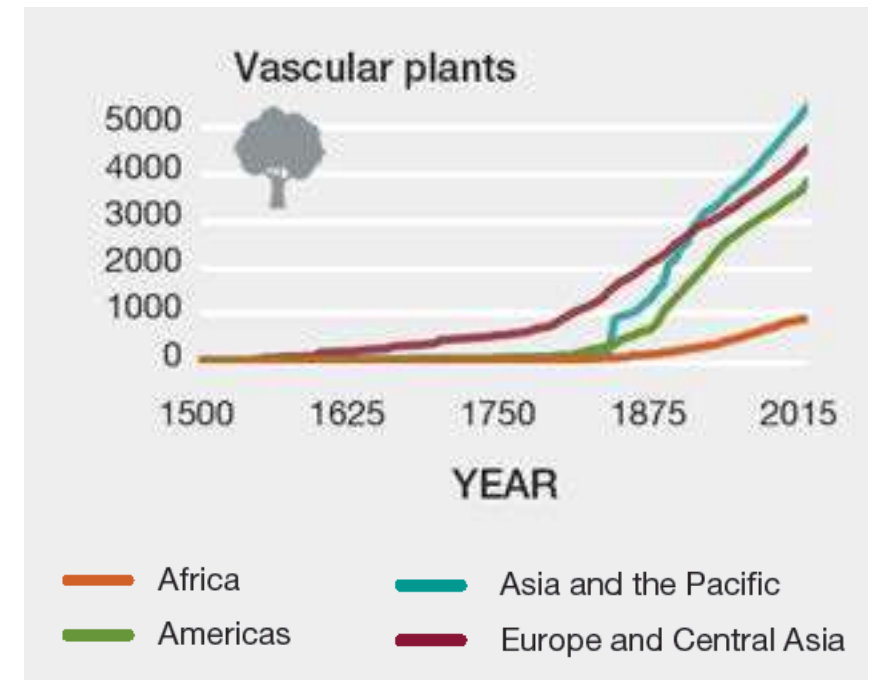


## STAGES OF INVASION

- TRANSPORT
- INTRODUCTION
- ESTABLISHMENT
- SPREAD

# How many IAS?

	Taxonomic group				
	Plants 	Invertebrates 	Vertebrates 	Microbes 	All taxa
<b>Number of established alien species</b>	19,365	8,282	3,242	1,257	32,146
<b>Number of established alien species with documented impacts</b>	1,061	1,852	461	141	3,515
<b>Percentage of invasive alien species</b>	5.5%	22.4%	14.2%	11.2%	<b>10.9%</b>





# Introductions of established alien species by pathway over time

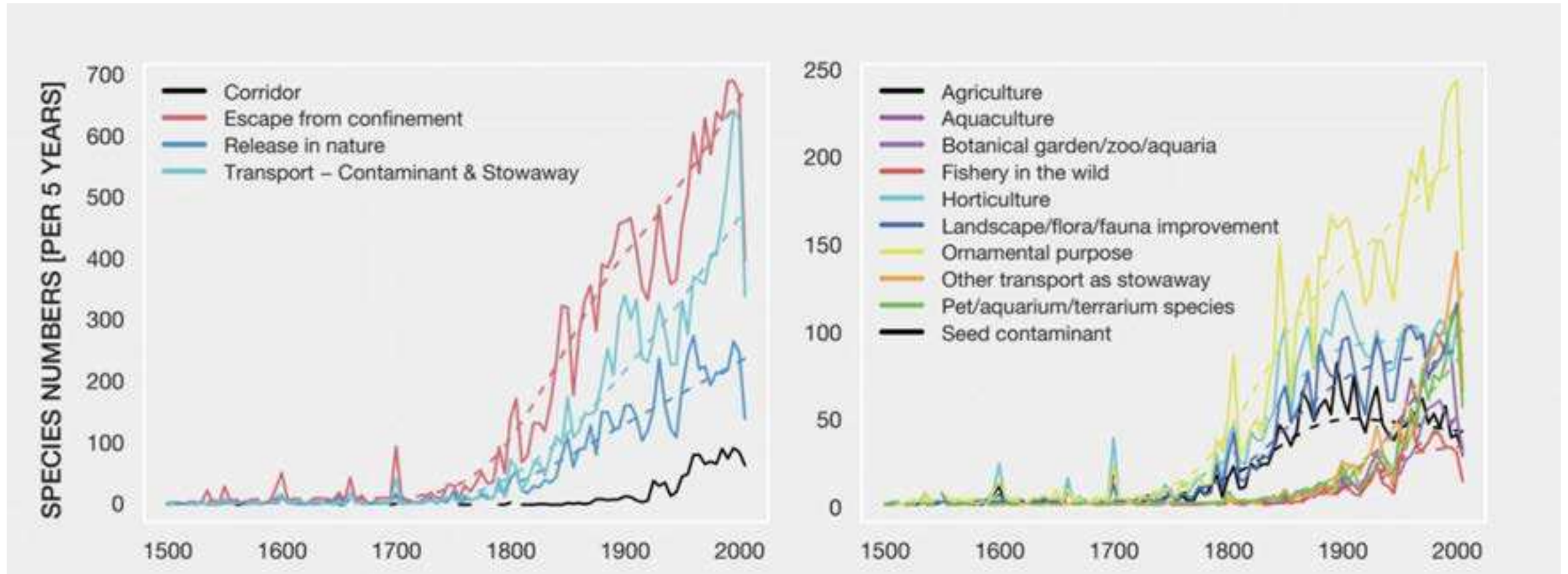


Figure: Seebens, H., Meyerson, L. A., Rahlao, S. J., Lenzner, B., Tricarico, E., Aleksanyan, A., Courchamp, F., Keskin, E., Saeedi, H., Tawake, A., and Pyšek, P. (2023). Chapter 2: Trends and status of alien and invasive alien species. In: Thematic Assessment Report on Invasive Alien Species and their Control of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Roy, H. E., Pauchard, A., Stoett, P. and Renard Truong, T. (eds.). IPBES secretariat, Bonn, Germany. <https://doi.org/10.5281/zenodo.7430725>

# IAS: major driver of global change

One of the five major direct drivers of change in nature globally, alongside

- land-use and sea-use change
- direct exploitation of organisms
- climate change
- pollution

IPBES (2023). Summary for Policymakers of the Thematic Assessment Report on Invasive Alien Species and their Control of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Roy, H. E., Pauchard, A., Stoett, P., Renard Truong, T., Bacher, S., Galil, B. S., Hulme, P. E., Ikeda, T., Sankaran, K. V., McGeoch, M. A., Meyerson, L. A., Nuñez, M. A., Ordóñez, A., Rahlao, S. J., Schwindt, E., Seebens, H., Sheppard, A. W., and Vandvik, V. (eds.). IPBES secretariat, Bonn, Germany. <https://doi.org/10.5281/zenodo.7430692>



# Economic impacts of IAS in the Nordic countries

- Total reported costs of invasive species in the Nordic countries were \$8.35 billion
- Damage costs significantly outweighing management costs
- In Norway, "Observed" costs were predominantly damage costs from aquatic IAS
- In Denmark and Sweden, terrestrial IAS caused the highest costs
- In Finland, mostly mixed costs
- Costs not available for most of the IAS
- Costs from invasions in the Nordics appear to be largely underestimated

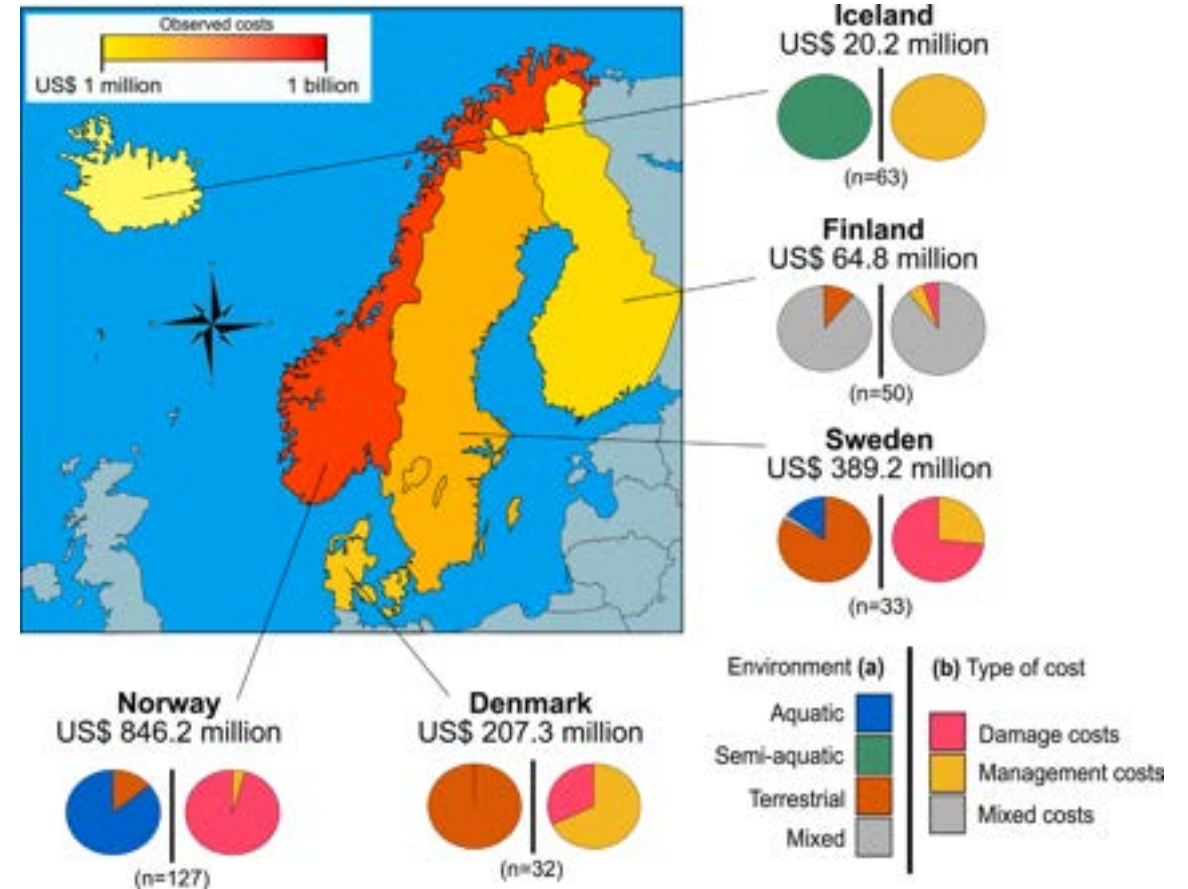


Figure: Kourantidou et al. 2022. <https://doi.org/10.1016/j.jenvman.2022.116374>



# Ecological impacts of invasive alien plants


- Species
  - Decline of population and (local) extinctions of native species
  - Decline in performance: growth, reproduction and fitness
  - Competition for resources (e.g., water, and space)
  - Hybridization
- Community
  - Decrease species richness
  - Change species composition
- Ecosystem
  - Change physical habitat, nutrient cycling, energy flow, microbial activity



Photo: Terhi Rytteri CC-BY-NC 4.0

# Number of invasive alien plant species causing negative or positive impacts on native taxa by region

A) Plants: Number of invasive alien species (number of impacts)

Region	Negative impacts caused by invasive alien plants 				Positive impacts
	Ecosystem impacts	Impacts on individuals	Population declines	Local extinction	
Africa	131 (576)	83 (153)	65 (184)	8 (31)	10 (28)
Americas	408 (2494)	151 (393)	196 (727)	21 (48)	109 (337)
Asia-Pacific	246 (1034)	182 (364)	109 (307)	19 (52)	42 (103)
Europe and Central Asia	129 (3767)	47 (174)	103 (805)	12 (55)	46 (406)
Antarctica		1 (1)			



# Challenges in the Barents region

- Especially arctic regions are vulnerable to environmental change
- Due to harsh climate, there are currently less invasive alien species in Barents region compared to more southern areas of Nordic countries and Russia
- More IAS are expected with climate change and increased human activity
- More negative impacts on nature and quality of life, economic costs



Photo: Arctic Centre, University of Lapland



Photo: Panu Orell

# Examples of invasive alien plant species in the Barents region





# Garden lupine (*Lupinus polyphyllus*)

- Native: North America
- Description:
  - Leguminous plant (Fabaceae)
  - Reproduction and spread by seeds
  - Widely spread especially in roadsides
- Pathways: Ornamental plant, garden waste, contaminated soil



Photo: Barents-ias.info



Photo: Miia Jauni



# Nootka lupine (*Lupinus nootkatensis*)

- Native: North America
- Description
  - Nootka lupine is a perennial leguminous plant
  - Grows about 0.5 to 1.2 metres tall.
  - Reproduces from seeds
  - Rarer than garden lupin in the Barents region
- Pathways: Ornamental plant, prevention of erosion (Iceland), reforestation



Photo: Barents-ias.info



Photo: Jouko Rikinen CC-BY-NC 4.0

# Environmental impacts of the invasive lupines

- Species
  - Reduces species richness of plants and insects (e.g. beetles, butterflies)
  - Threaten red listed species in roadverges and meadows
  - Alkaloids of *Lupinus* species hinder seed germination and growth of other species
- Community
  - Change the plant community composition
  - Potential impact on pollinator communities
    - *Lupinus* species contains lupanin, a toxic alkaloid which can hamper the reproduction on bumblebees
    - *L. nootkatensis* inadequate as food source for majority of pollinators in Iceland (Willow et al. 2017 <https://doi.org/10.16886/IAS.2017.06>)
- Ecosystem
  - As nitrogen-fixing plant may increase nitrogen and organic matter content of soils



Photo: Hedwig Storch, CC BY-SA 3.0 via Wikimedia Commons

# Hogweeds (*Heracleum mantegazzianum*, *H. persicum*, *H. sosnowskyi*)

- Native: Asia
- Description
  - Perennial herb
  - Up to 3 m in height
  - Prolific seed production
  - Vigorous growth
  - Tolerates wide range of environmental conditions
- Pathways: Ornamental plant, garden waste, soil contaminant
- Impacts
  - Environmental
    - Form monospecific stands with large biomass and extensive litter production
    - Change composition and diversity of native species
    - Increase soil erosion
  - Social
    - Affect human health: contain furanocoumarins causing serious dermatological effects on skin contact



Photo: Barents-ias.info



Photo: Terhi Rytteri CC-BY-NC 4.0



# Japanese knotweed (*Reynoutria japonica*)

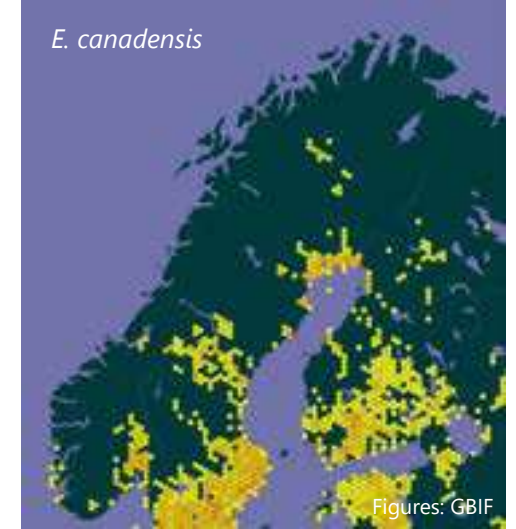
- Native: Japan, China, Taiwan, Korean peninsula
- Description
  - Vigorous growing herbaceous perennial
  - Up to 3 m in height
  - Spreads mainly vegetatively
  - Can tolerate harsh conditions
- Pathways: Ornamental plant, contaminant of soil and compost
- Impact
  - Economic and social:
    - Most costly IAS across Nordics total costs 1.138 billion \$ (Kourantidou et al. 2022)
    - Control costs
    - May damage buildings, reduce property value
  - Environmental:
    - Reduces native species abundance and diversity
    - Increased risk of soil erosion in riverbanks



Photo: Jouko Rikkinen CC-BY-NC 4.0

# Nuttal's waterweed (*Elodea nuttallii*) & Canadian waterweed (*E. canadensis*)

- Native: North America
- Description
  - Perennial submerged aquatic plant
  - High growth rate
  - Vegetative reproduction through fragments
  - High tolerance to wide range of environmental conditions
- Pathways: Aquarium and garden plant, dispersed by waterfowl and currents, fishing equipments etc.
- Impacts
  - Ecological
    - Dominate macrophyte communities
    - Forms dense stands and displace other aquatic plants
    - Reduce biodiversity
    - Ecosystem impacts: Reduce water movement, cut off light, produce anoxic conditions, increase eutrophication
  - Social: interfere with boating, fishing and adversely affect recreation activities



# False spiraea (*Sorbaria sorbifolia*)

- Native: Asia (from Siperia to Japan and Korea)
- Description
  - Perennial deciduous shrub
  - Leaves a bit like mountain ash (*Sorbus aucuparia*)
  - Aggressive vegetive reproduction and spread by root suckers
  - Modest habitat requirements
  - Tolerate harsh conditions
- Pathways: Ornamental plant, garden waste, contaminated soil
- Impacts
  - Form dense thickets
  - Invade forests, road sides and protected areas
  - Affect germination and abundance of native plants species
  - Change species composition
  - Reduce diversity



Photo: Jouko Rikkinen CC-BY-NC 4.0



# IAS management strategy: prevention is the most cost-effective

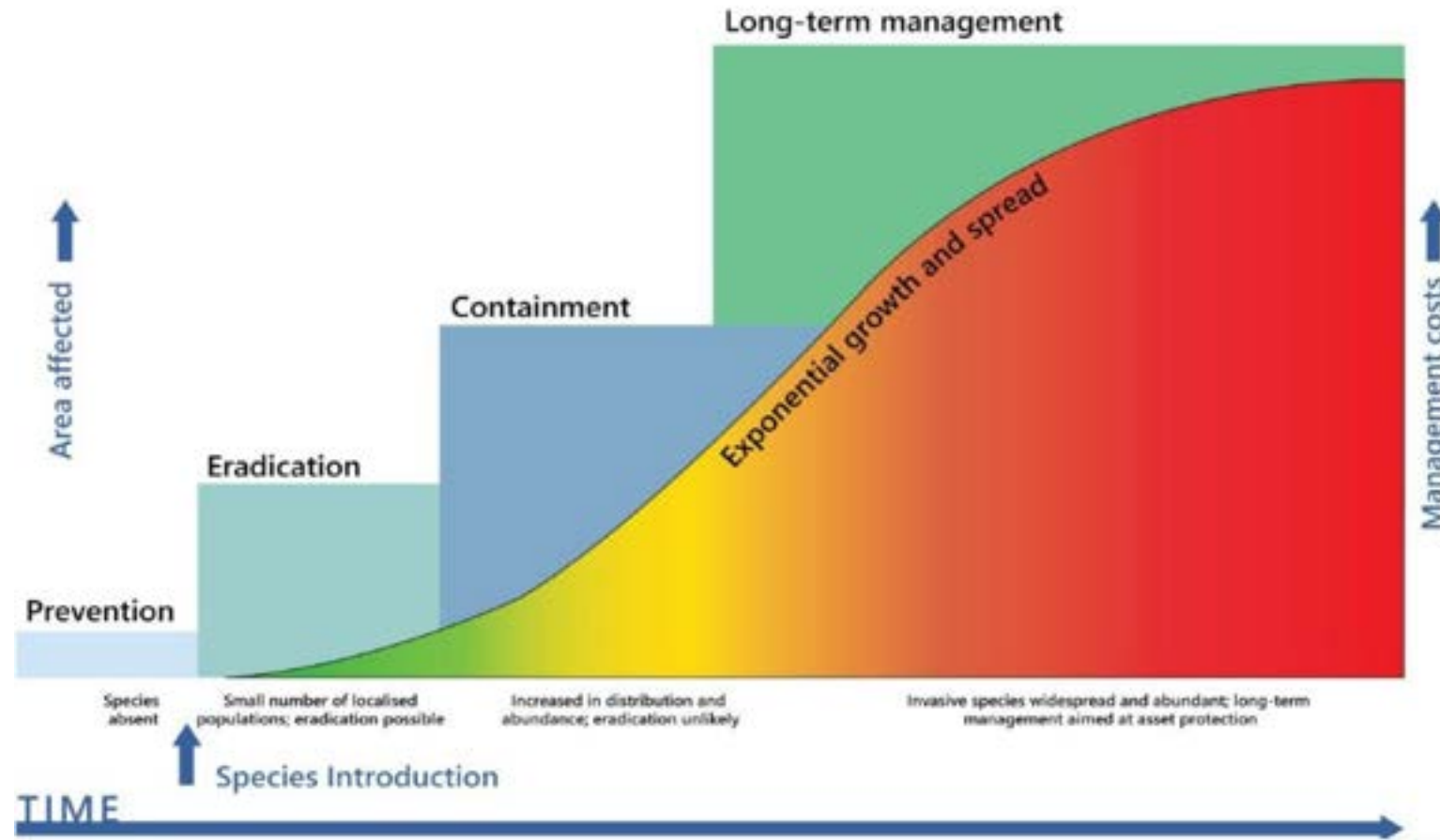


Figure: Invasive Species Council Australia

# Thank you!



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