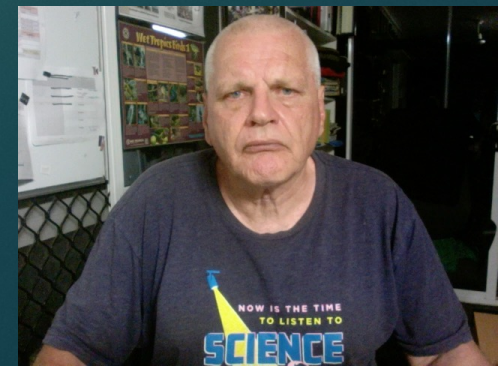
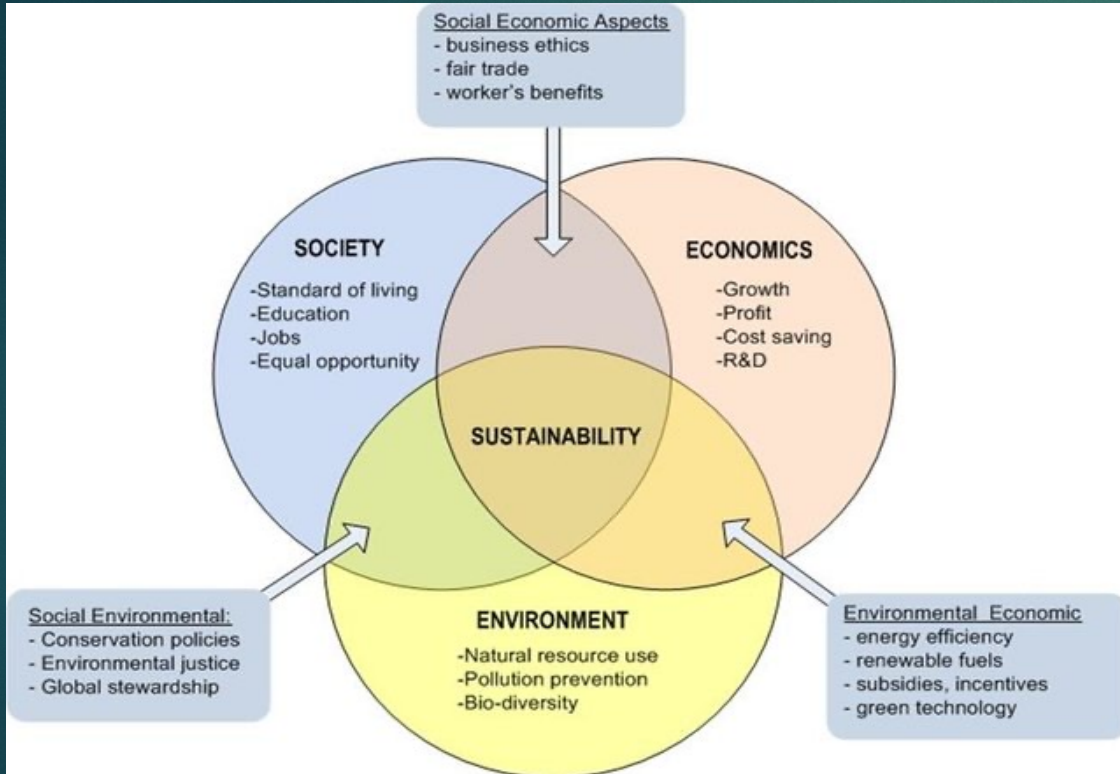


How to ensure Sustainable Frog populations in Australia

KEITH CARDWELL 2022



Sustainable Development



Irsan and Utama, 2019

THE GLOBAL GOALS

For Sustainable Development



Global Goals, 2022



Three concepts of Environmental Sustainability

1. Balance – natural stabilisation
2. Limits – carrying capacity
3. Diversity – desirable and necessary



*Objectives
we wish to
answer in
this
discussion*

- To describe the status of existing frog populations in Australia
- List their greatest values
- Identify the populations of prime concern
- Identify at least five main threats to their existence
- To describe at least two current methods being employed to assist with the mitigation of decline and at least two methods to employ to ensure the future sustainability of frog populations in Australia, and -
- What you can do today!





So what value are they to us?

- Insect eaters
- Food source
- Tadpoles keep waterways clean by eating algae
- Indicators of environmental health
- Medical Research
- For the most part – they look terrific!



The frog populations of Australia

214 species have been identified in Australia with the greatest diversity in northeast Queensland (Australian Government; Department of the Environment & Heritage, 2022; Rowley et al., 2019)

But we can not maintain sustainable frog populations unless we can halt what is constantly reducing their numbers

Amphibian Research Centre



Frogs in Peril

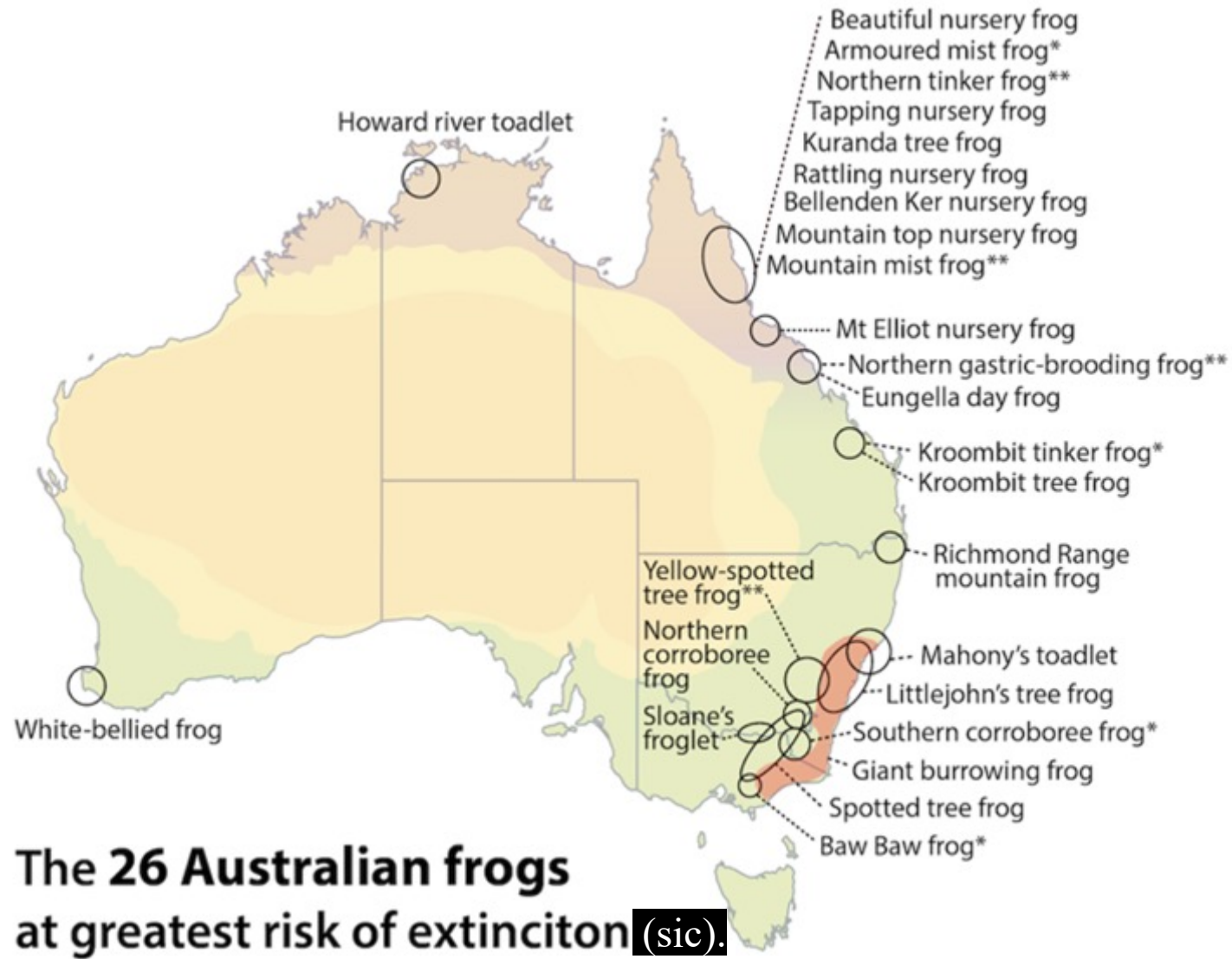


Figure courtesy: Australian Government, Department of Agriculture, Water and the Environment, 2021, Threatened Species Recovery Hub, *National Environmental Science Programme*



► *Their major disease threat*



CHYTRIDIOMYCOSIS
(AMPHIBIAN CHYTRID
FUNGUS DISEASE)

Chytridiomycosis is an infectious disease that affects amphibians worldwide. It is caused by the chytrid fungus, *Batrachochytrium dendrobatidis* (*Bd*) (Sopniewski et al., 2021)



*Anthropogenic
disturbances
to their existence
(much of which is
associated with
Climate Change)*

The Royal Society (n.d)

Pollution

Exploitation

Habitat
fragmentation
and loss

Warming and
acidification

Invasive
species



Insecticide & Herbicide used in agriculture and horticulture

Pollution



Chemical contamination via runoff into frog habitats, waterways in particular.



Exploitation



Photo: foodtastic



Photo Cardwell 2022



Photo Cardwell 2022

2022/07/27

- Food sources
- Pets: Frog Care 101: What You Need to Know Before You Get a Frog
- Fresh *water* resources reduced for human use and depleting appropriate spawning areas



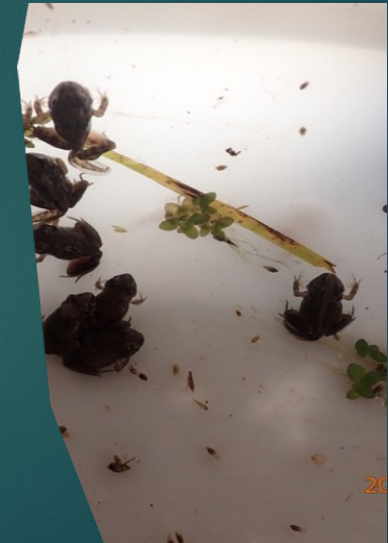
Habitat fragmentation and loss



Dams and culverts

to

Tyre track puddles



Warming, salinification, acidification

Summer estuary temperatures in Queensland have increased more than 2.00 degrees C since 2008 (Scanes et al., 2020)

Findings from a long-term study of 35 years in the Northern Hemisphere, by Weiss et al., 2018, found that freshwaters acidify at a faster rate than oceans, pCO₂ quadrupled, pH >0.5 units

Acidity does not favour frog survival (Beattie et al., 1991)

On the positive side, increased temperature > 25 degrees C appears to decrease probability of Bd infection (Rowley & Alford, 2013)



GAMBUSIA



Photo: Gambusia or mosquitofish: restricted noxious fish, Queensland Government, 2022

*Introduction of
invasive species*

CANE TOAD



Photo: Cane Toad, Australian Museum, 2022



Current methods currently employed to assist with the mitigation of frog mortality

Population restoration <i>Within native range</i>		Conservation introduction <i>Outside native range</i>	Other
Reinforcement (or augmentation) Release of animals into areas supporting conspecifics to increase population viability	Reintroduction Movement of animals into areas from which they have been extirpated with the goal of establishing a population	Assisted colonisation Release of animals outside their indigenous range with the goal of establishing a population	Mitigation translocation* Relocation of animals from an area where habitat is being altered or threatened



What you can do today!

- ▶ Citizen scientists
- ▶ Generating data
- ▶ Frog ID app.

Photo: Australian Museum



We have now looked at several issues regarding the extent and decline of the frog population in Australia and you should now be able to:

Describe the status of existing frog populations of Australia

List their greatest values

Identify the populations of prime concern

List at least five main threats to their existence

Describe at least two current methods being employed to assist with the mitigation of the decline and how to achieve future sustainability of Australia's frog populations

What you can do today!

Conclusion



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